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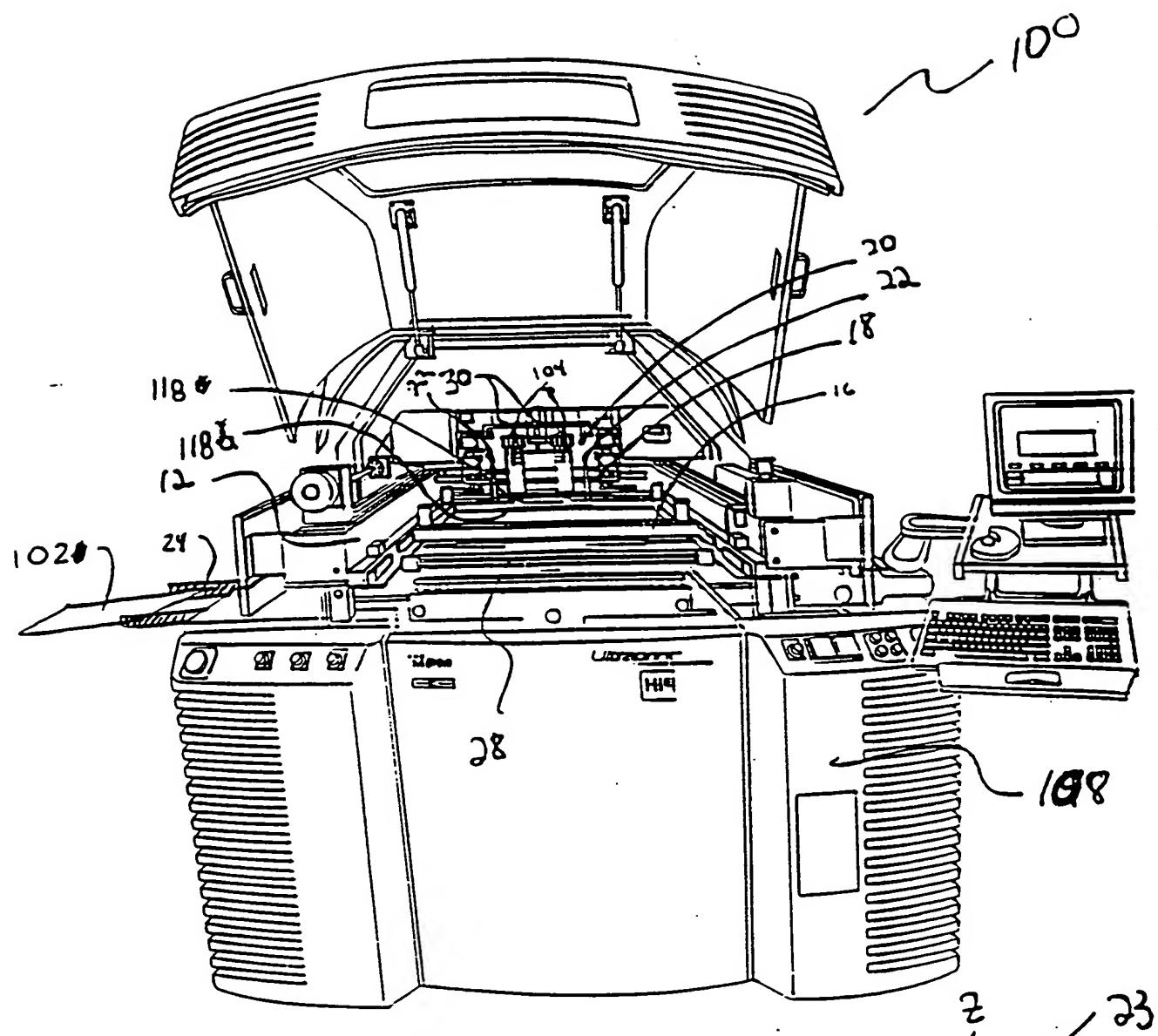
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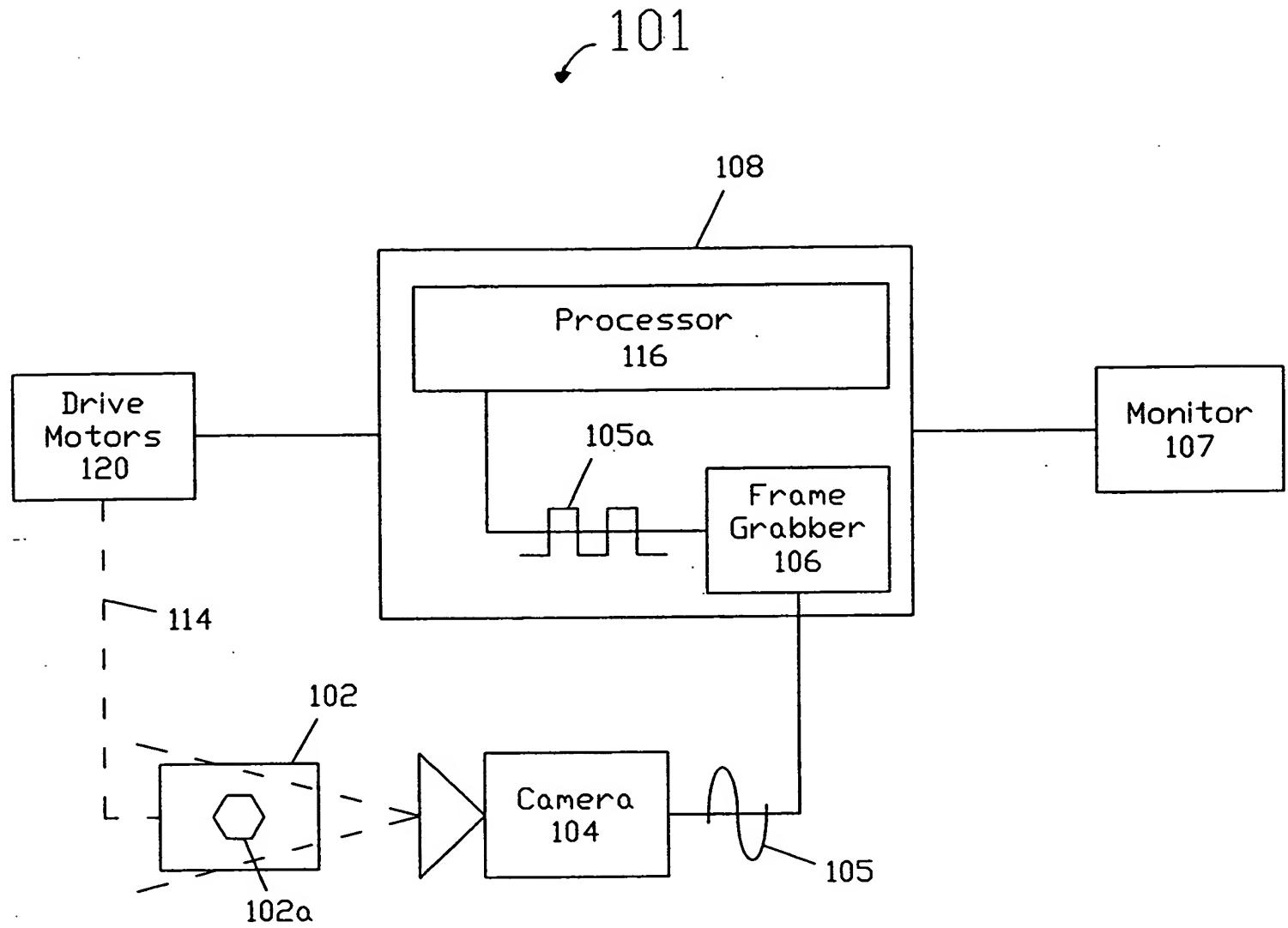


FIG. 1B

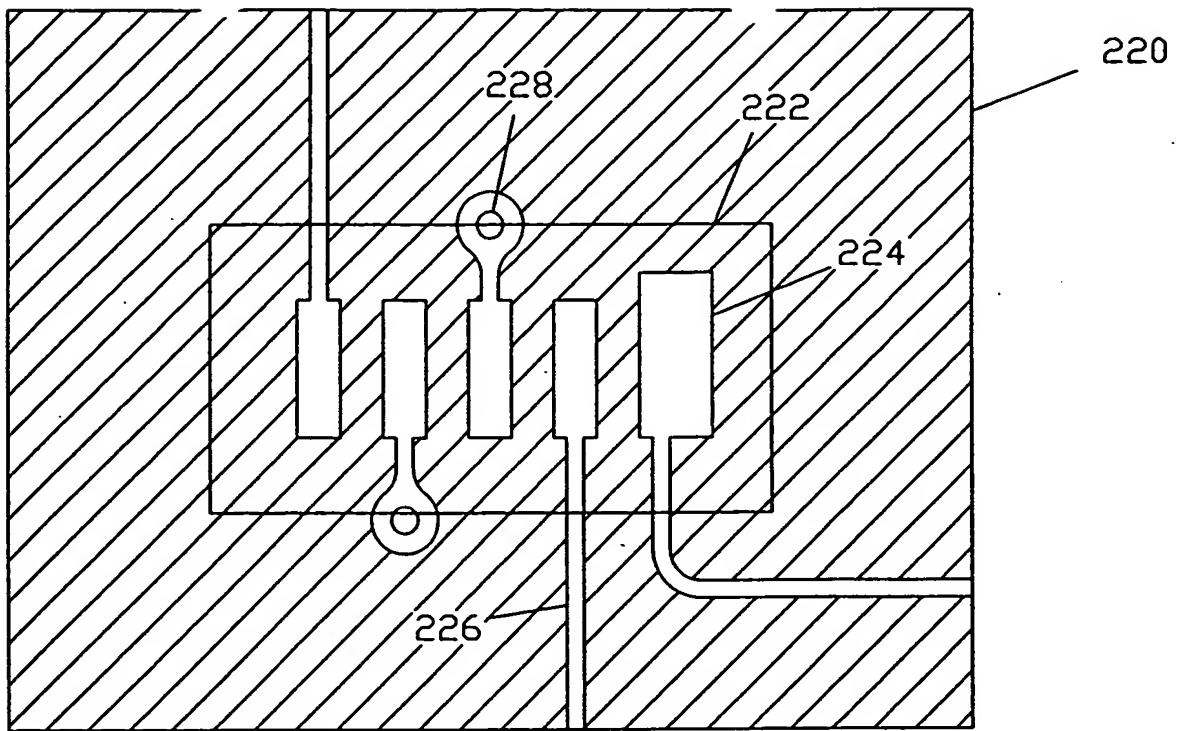


FIG. 2A

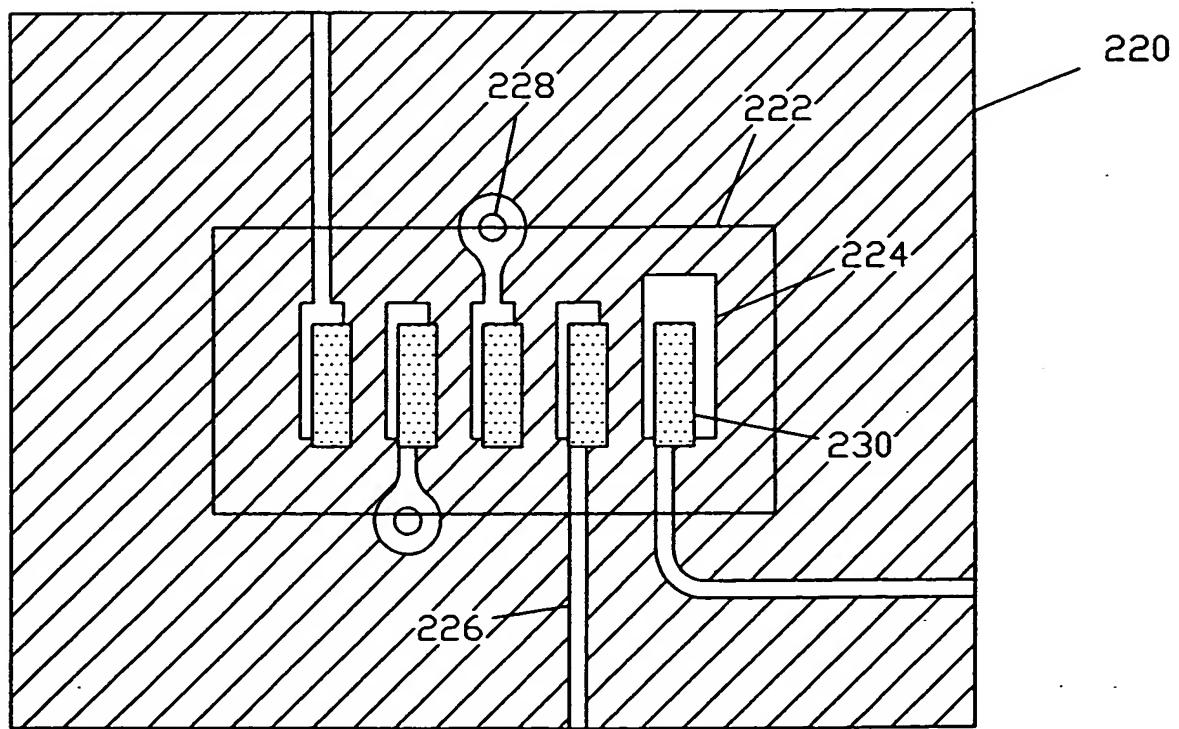


FIG. 2B

300

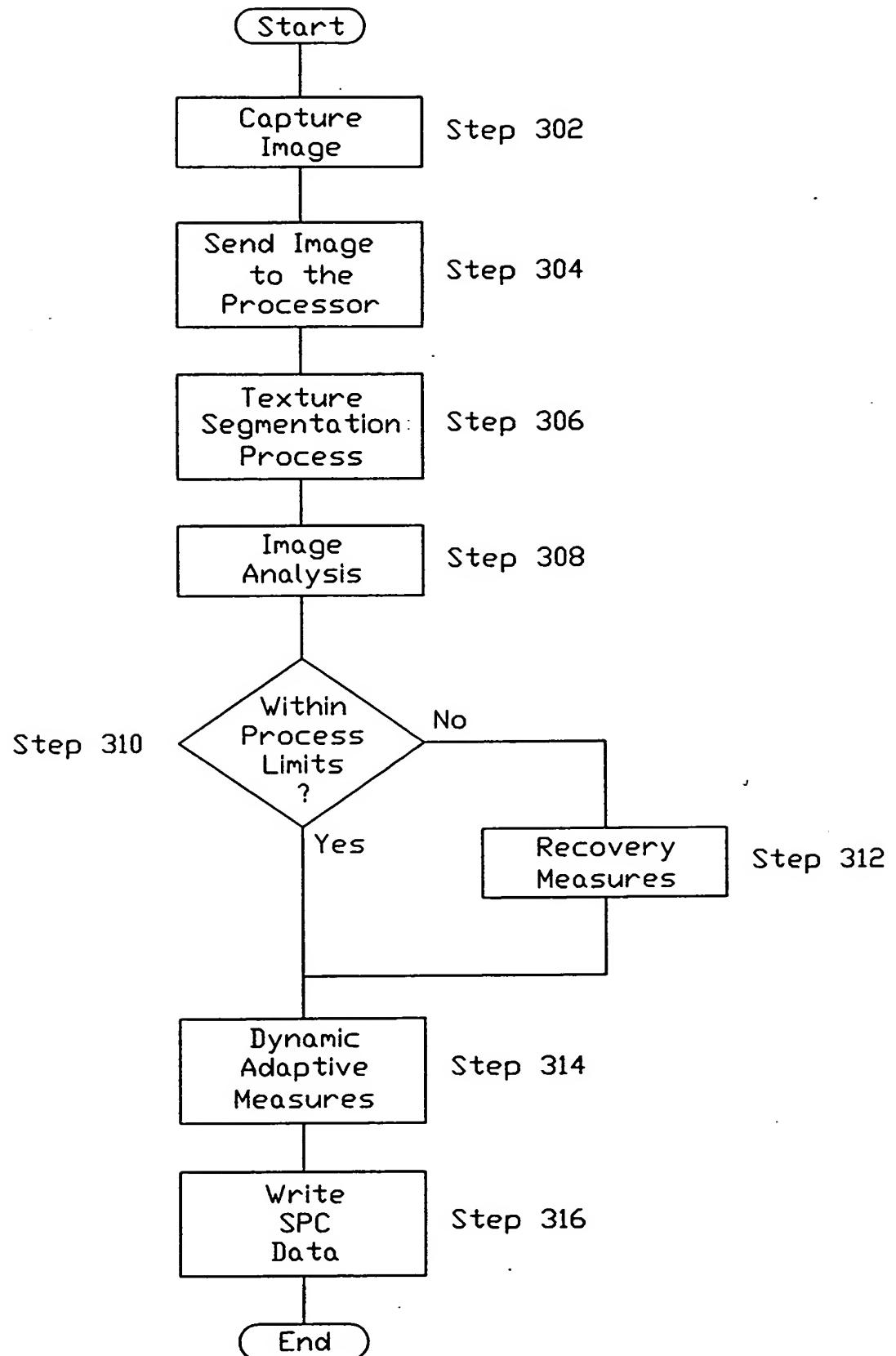


FIG. 3

116

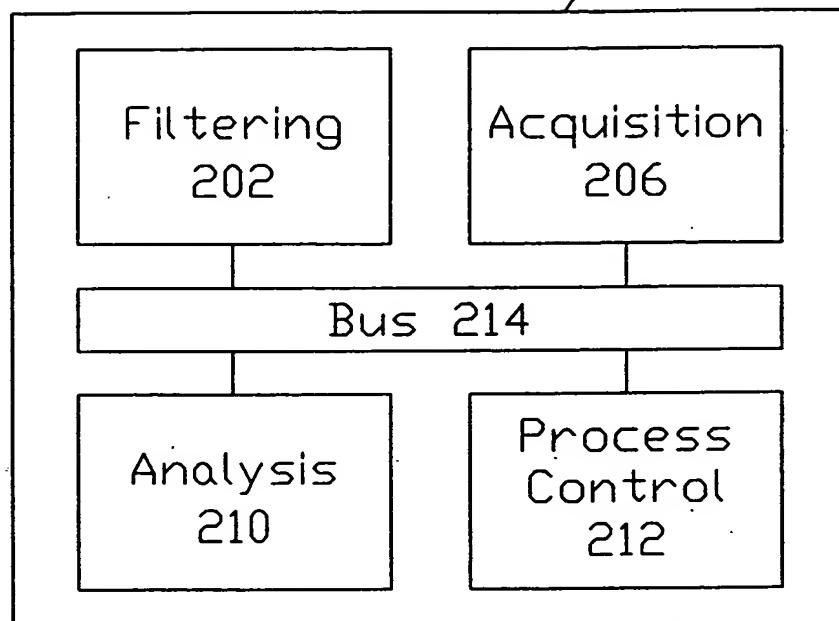


FIG. 4A

202

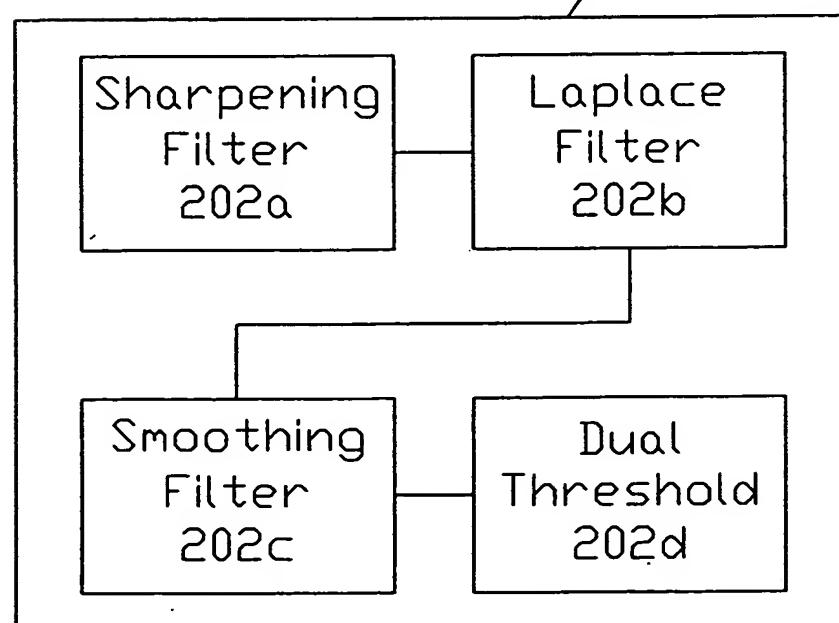


FIG. 4B

	1	
1	-4	1
	1	

FIG. 5A

	-1	
-1	5	-1
	-1	

FIG. 5B

1	1	1
1	1	1
1	1	1

FIG. 5C

500

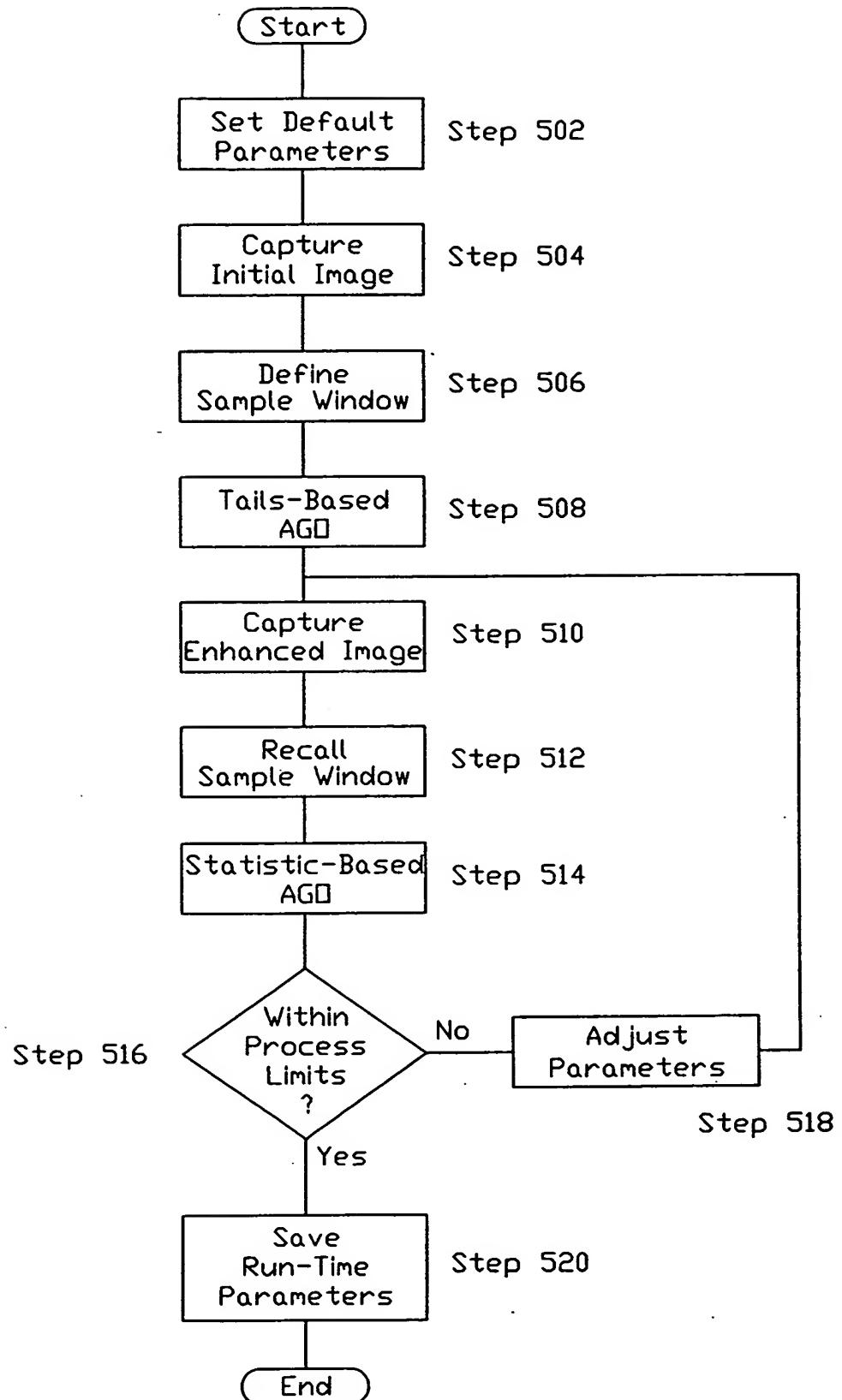


FIG. 6

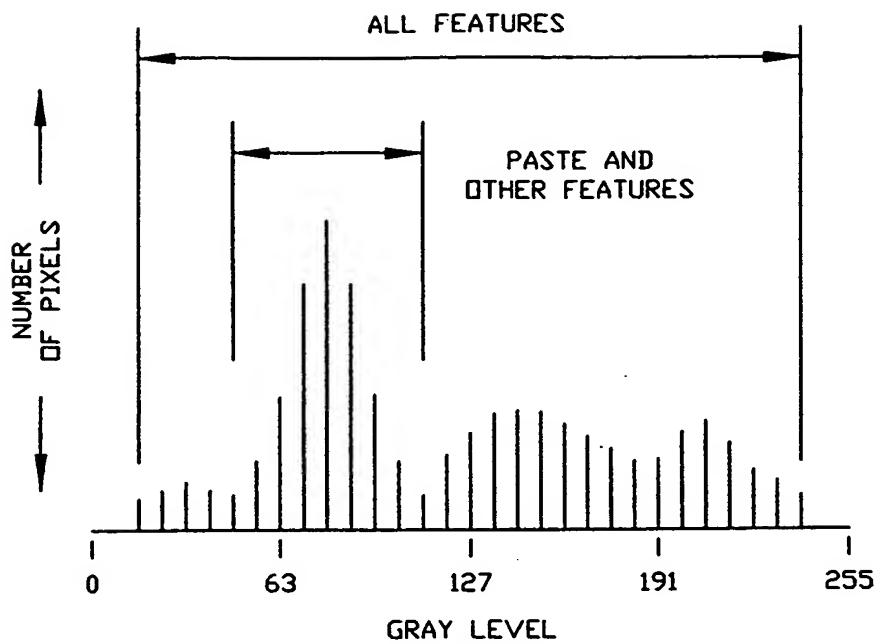


FIG. 7A

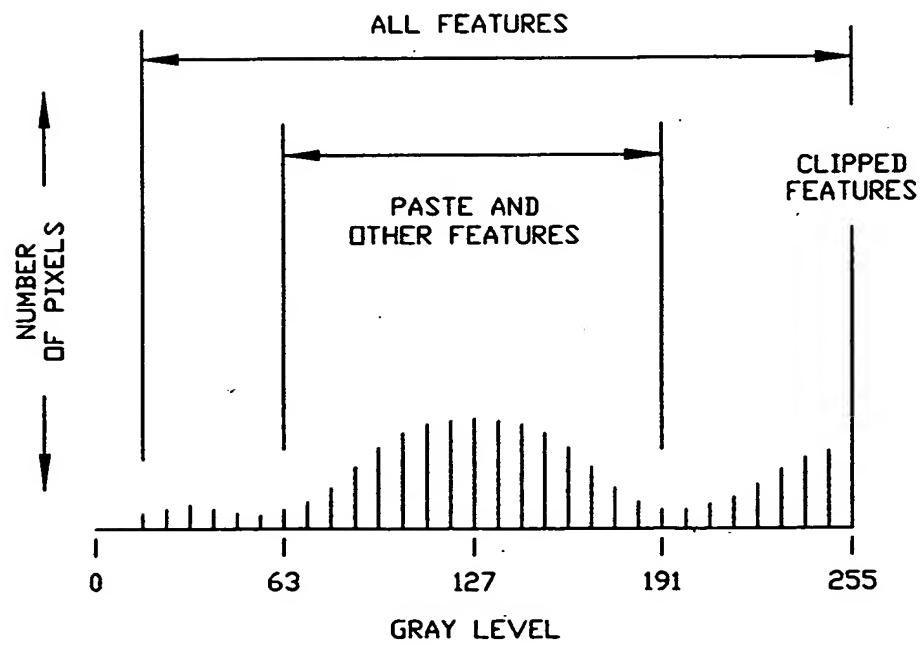


FIG. 7B

0.6621 mpp

$\phi 1.3242$

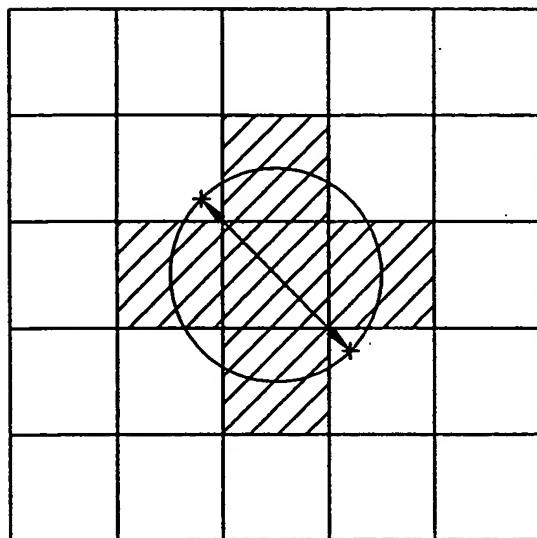


FIG. 8A

$\phi 1.8727$

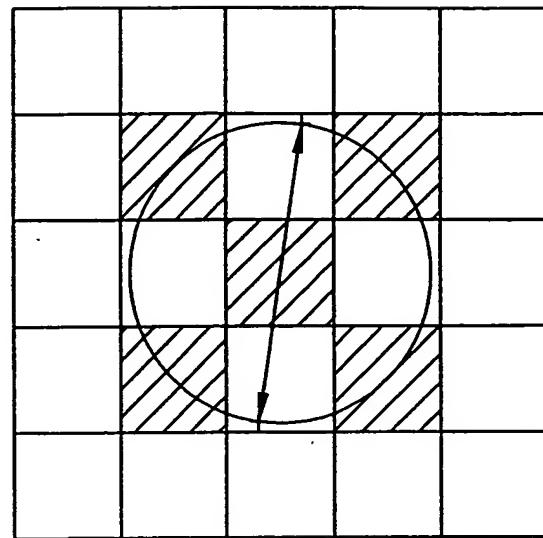


FIG. 8B

$\phi 2.6484$

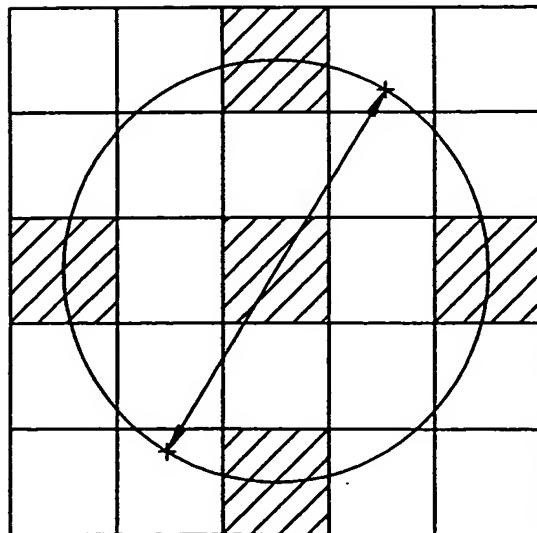


FIG. 8C

$\phi 3.7454$

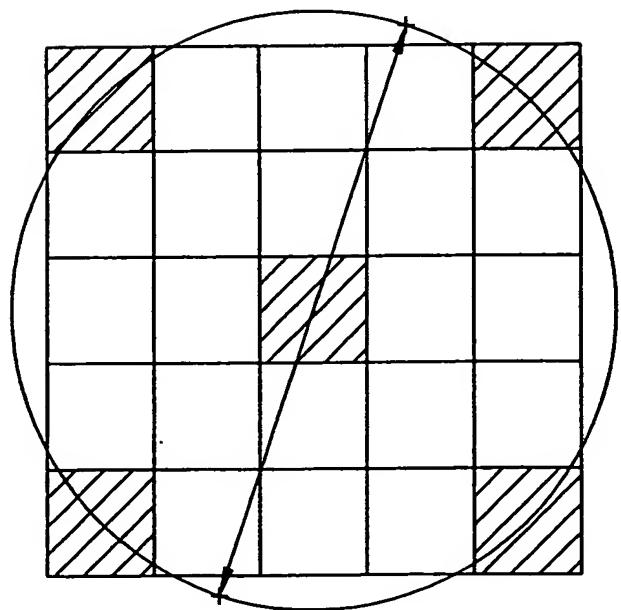
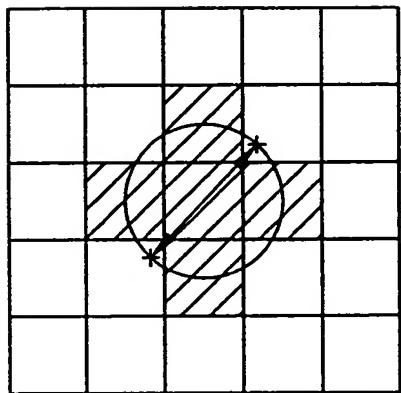


FIG. 8D

0.4797 mpp

ϕ 0.9594



ϕ 1.3568

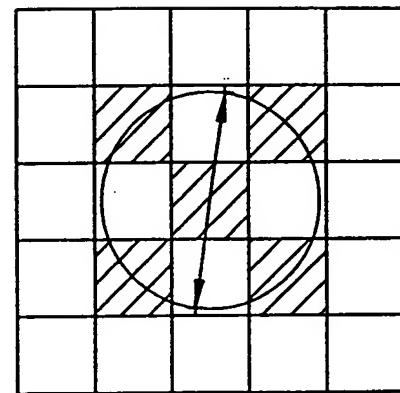


FIG. 8E

FIG. 8F

ϕ 1.9188

ϕ 2.7136

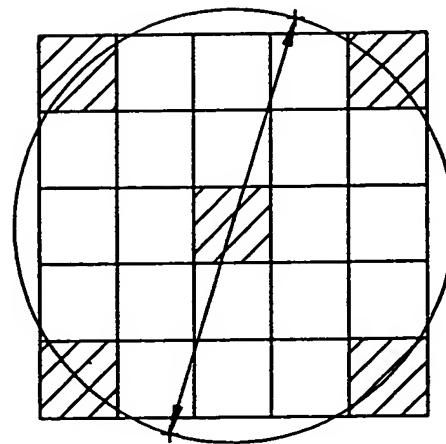
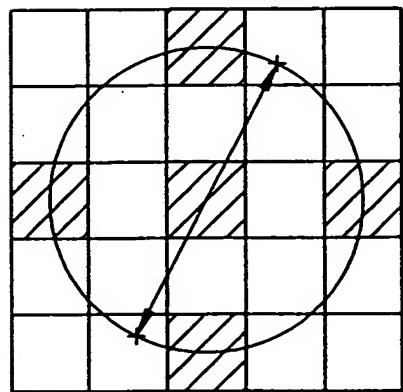
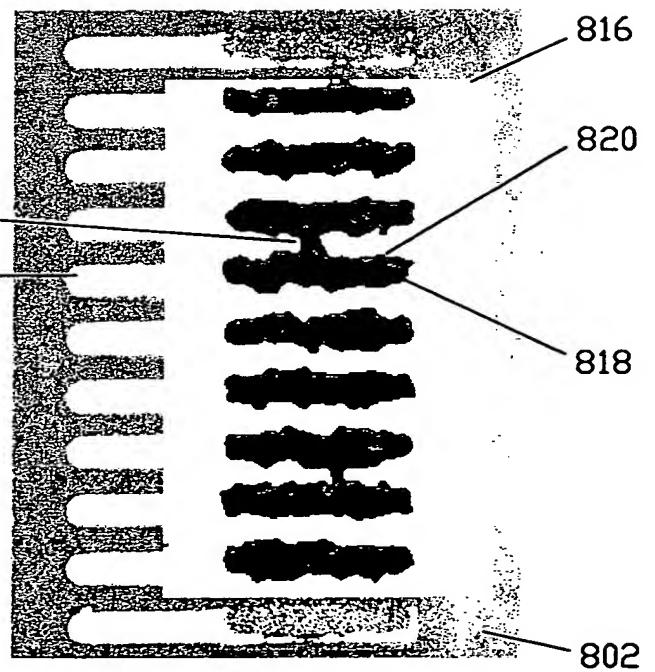
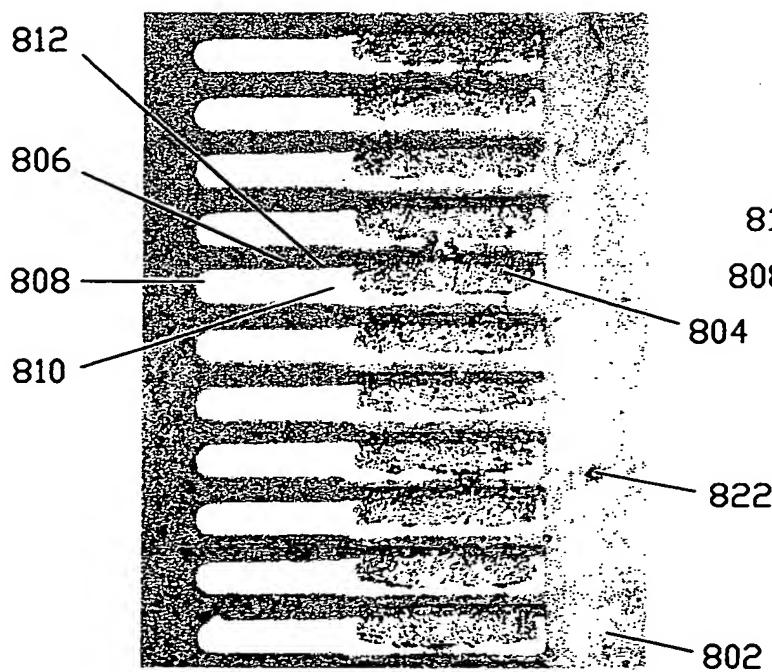
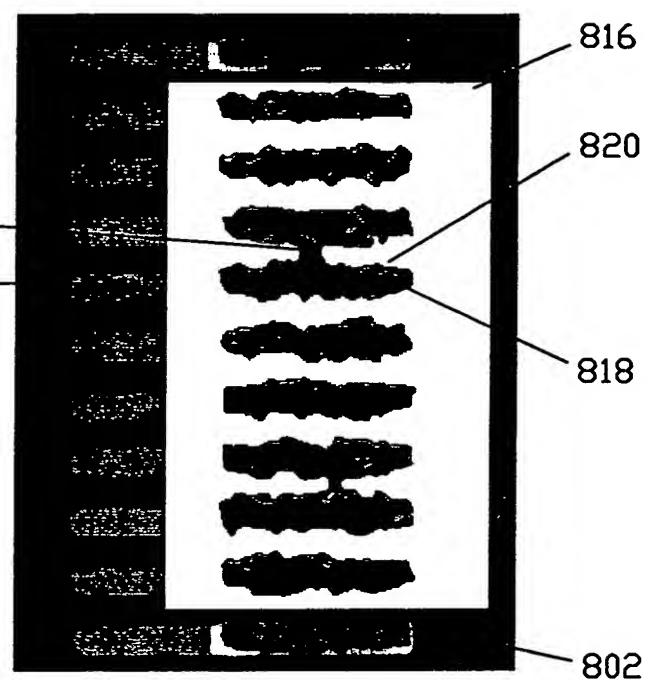
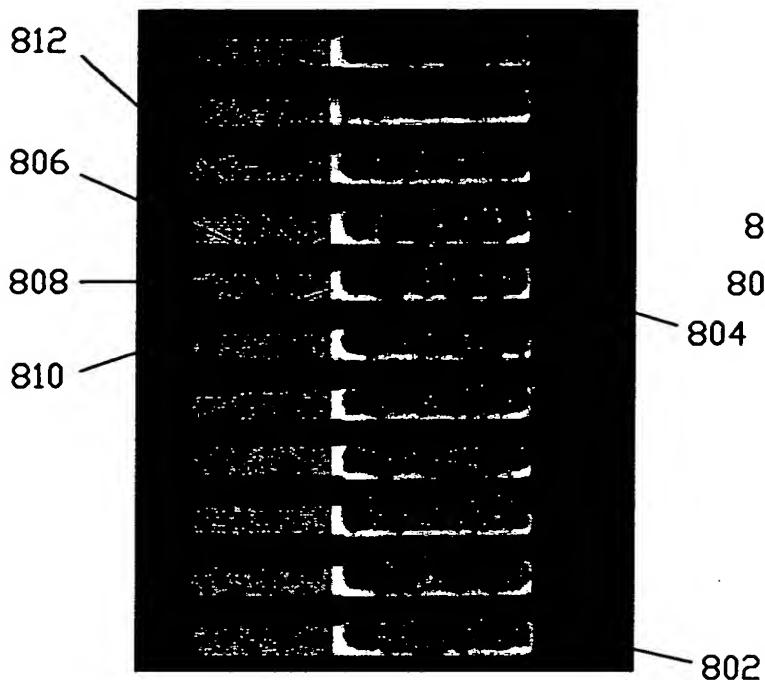


FIG. 8G

FIG. 8H



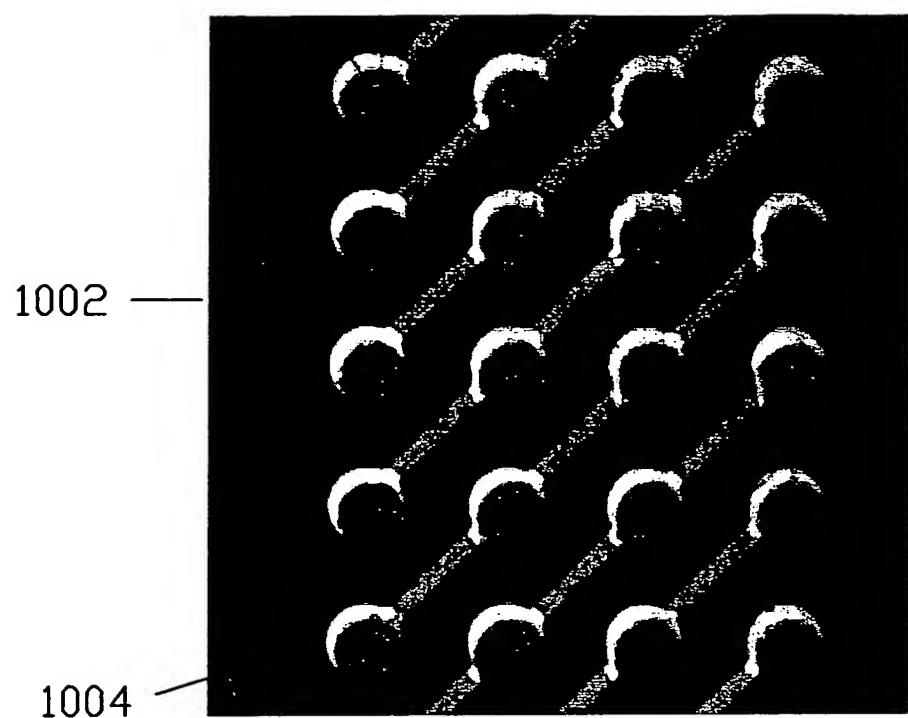


FIG. 10A

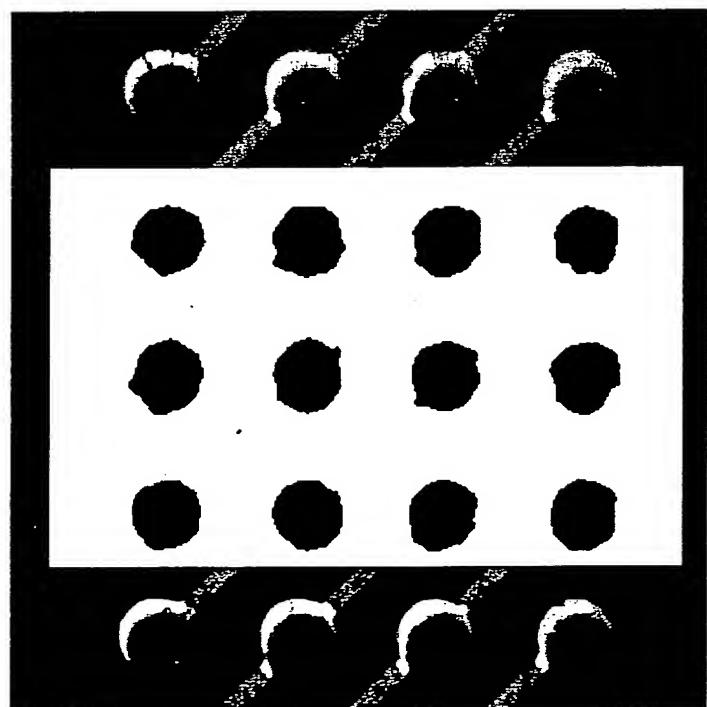


FIG. 10B

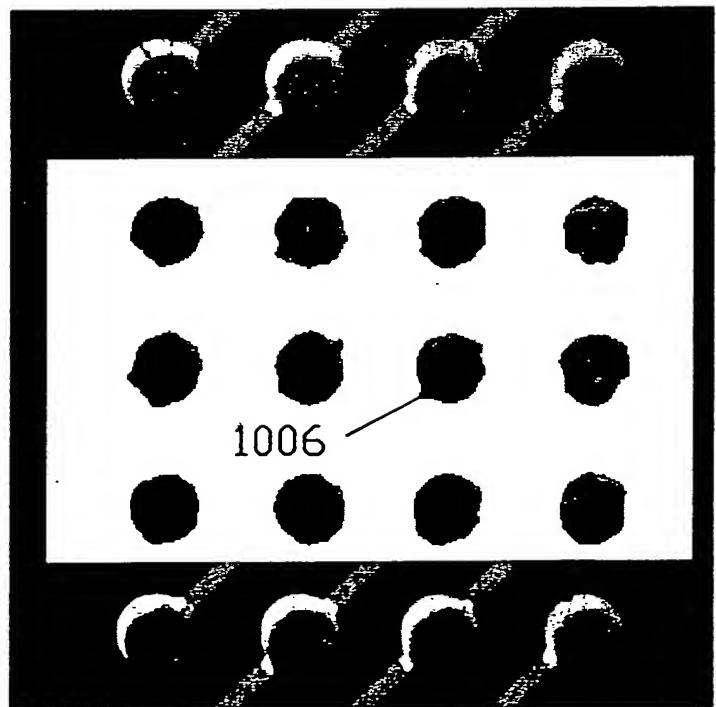


FIG. 10C

1002 —

1004 —

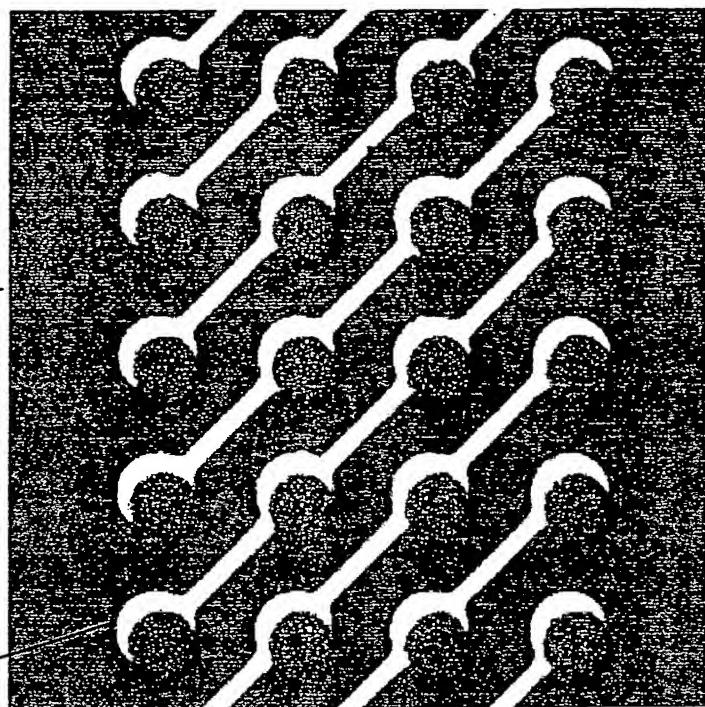


FIG. 11A

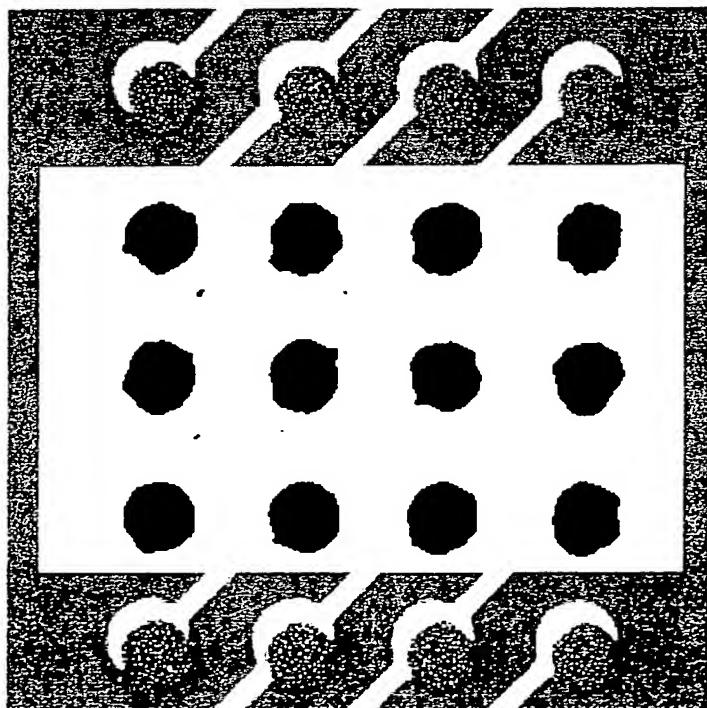


FIG. 11B

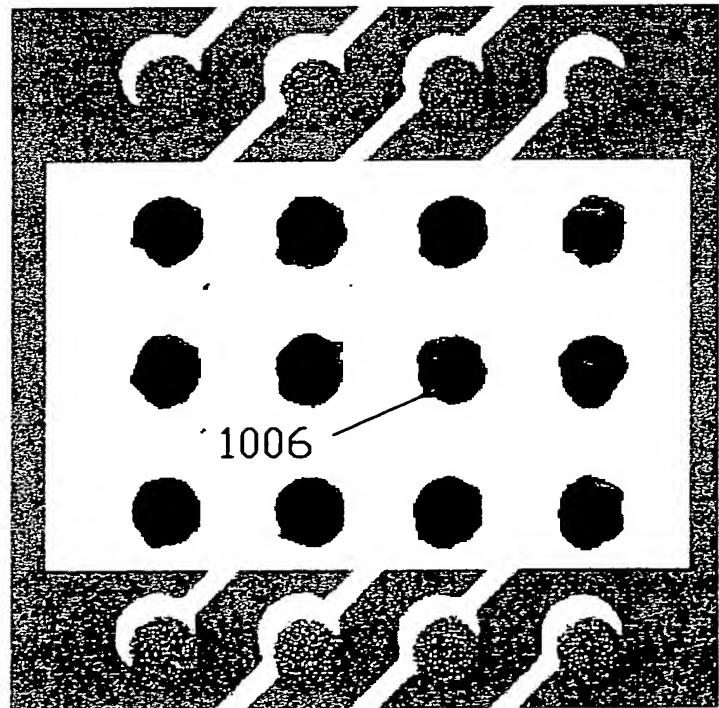


FIG. 11C

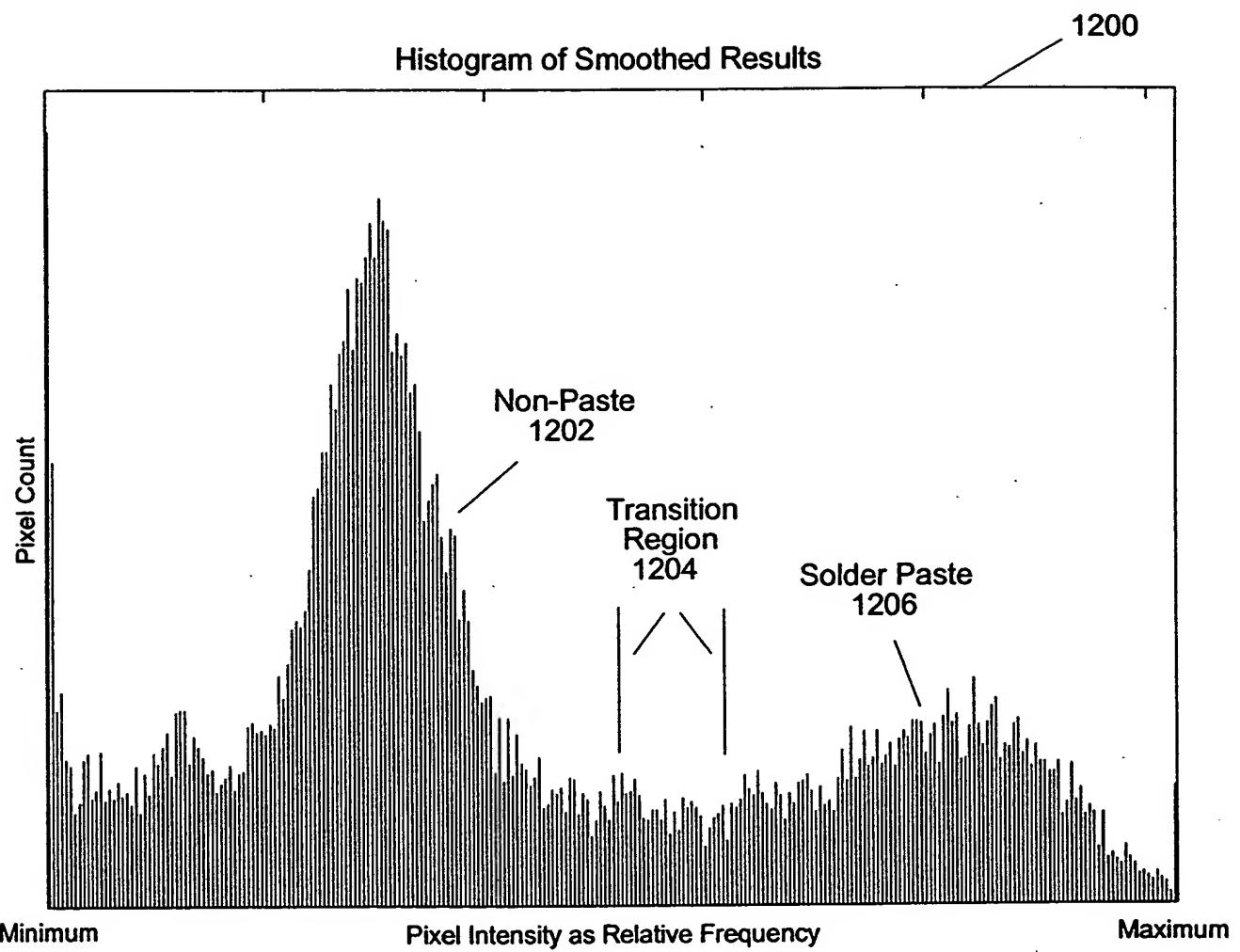


FIG. 12

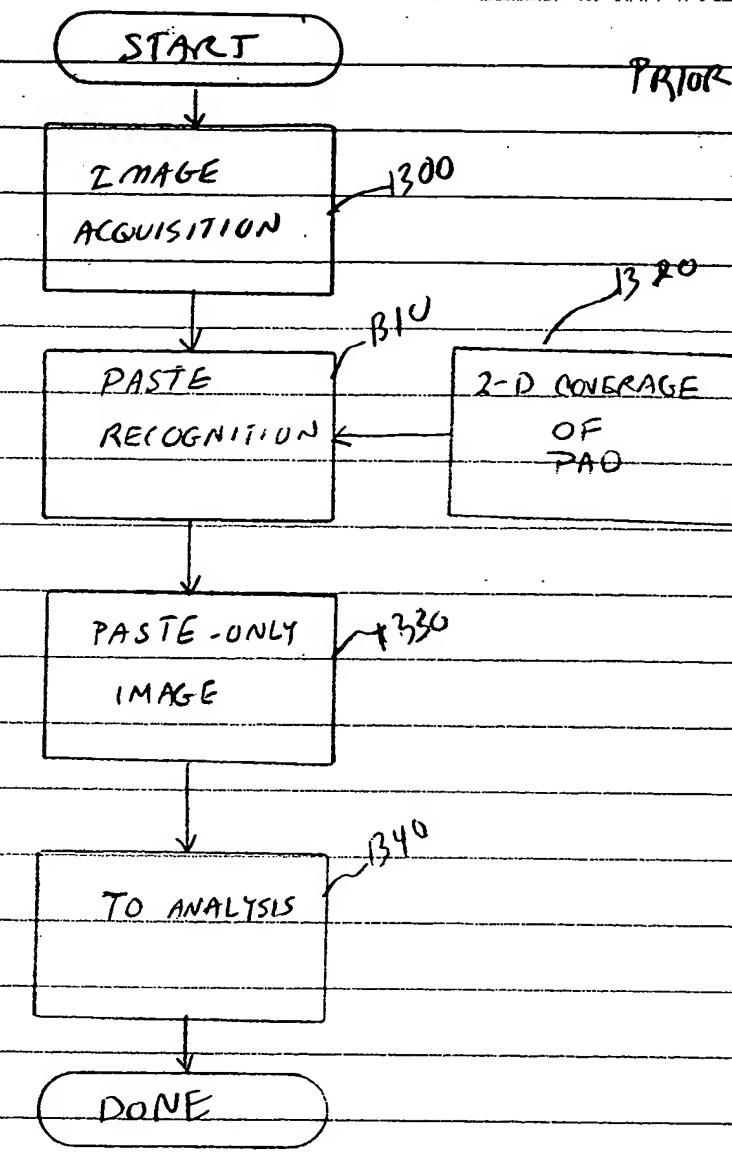


FIG. 13 generalized method for inspecting substrates.

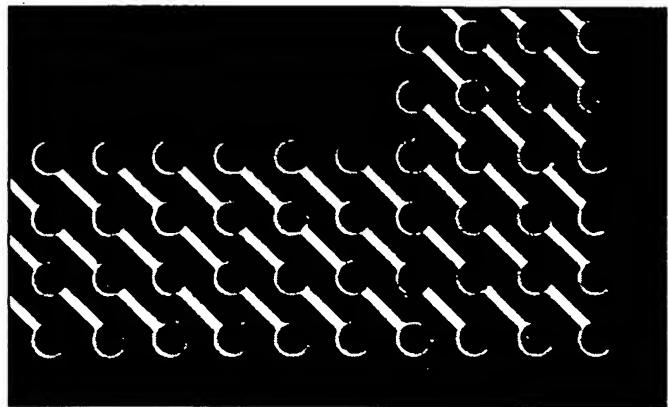


FIGURE : Grayscale image of paste using "white" light source.

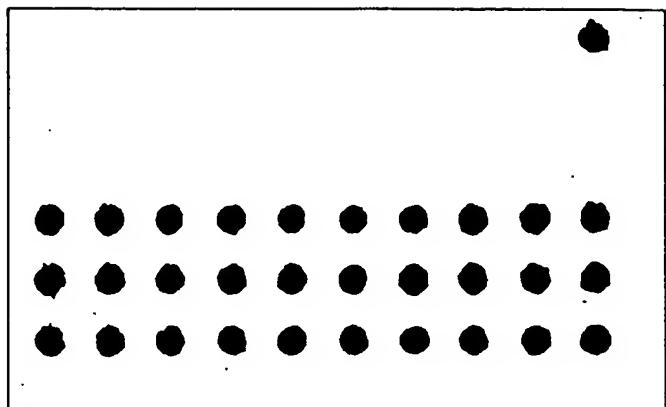


FIGURE : Weighted paste-only image via unique texture-based method.

FIG 14

FIG. 15

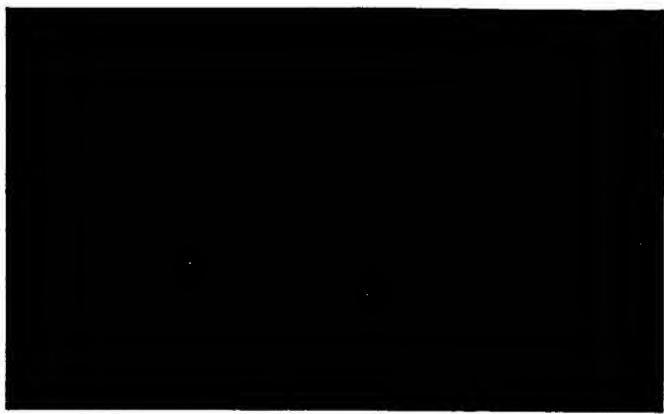


FIGURE 2a: RGB image of UV enhanced fluorescent paste.

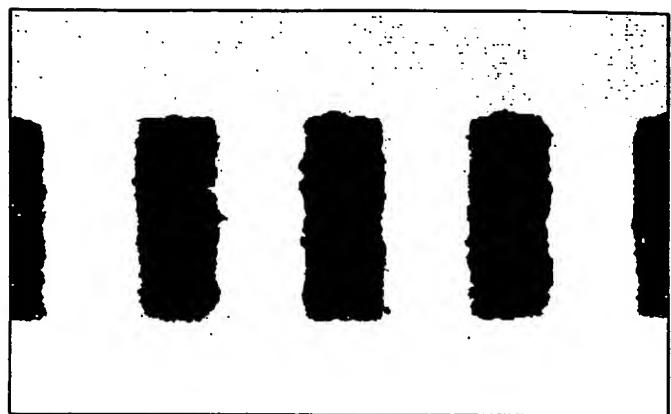


FIGURE 2b: Binary paste-only image from blue channel via single threshold method.

FIGs 16

Fig 17

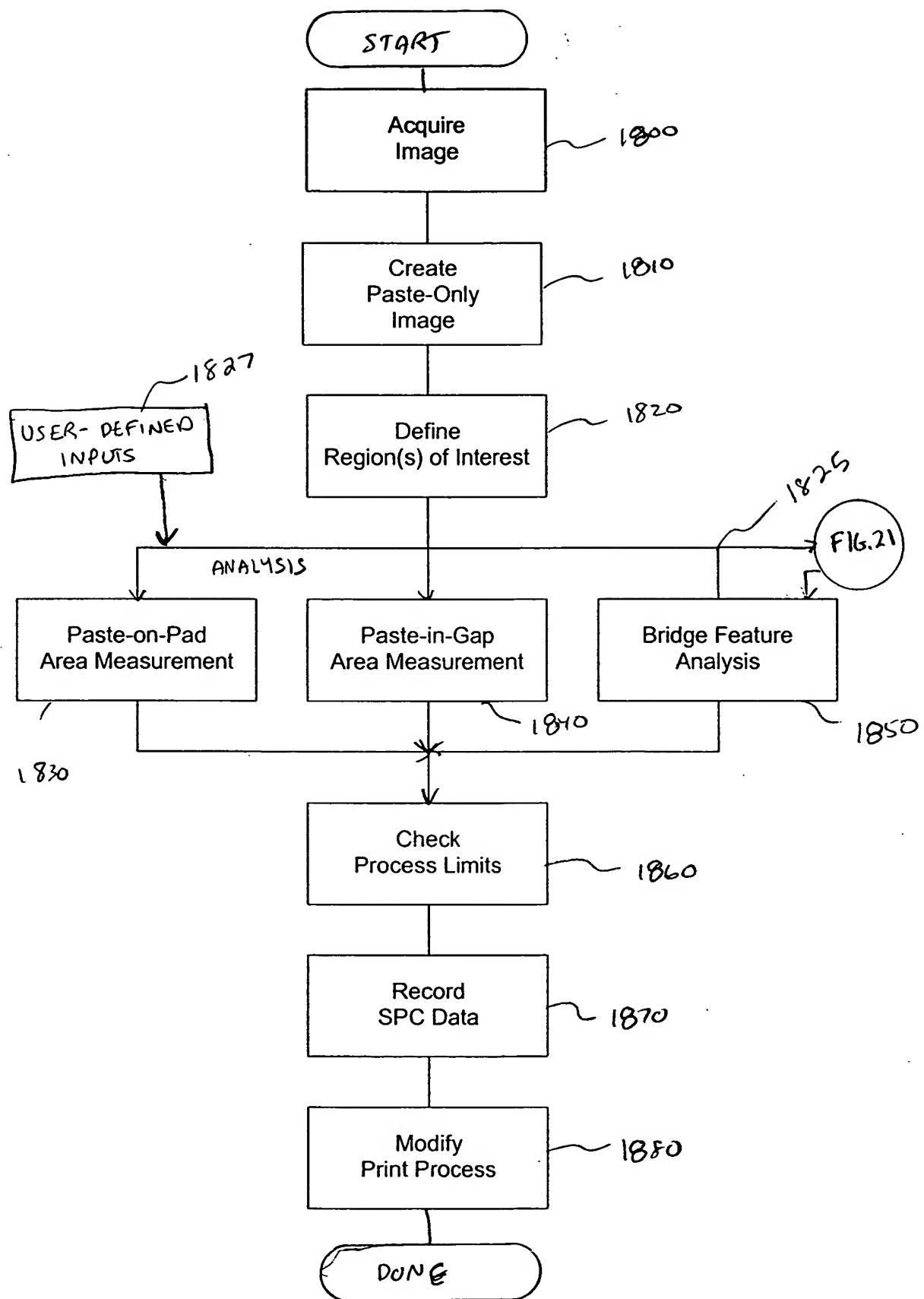


FIG. 18

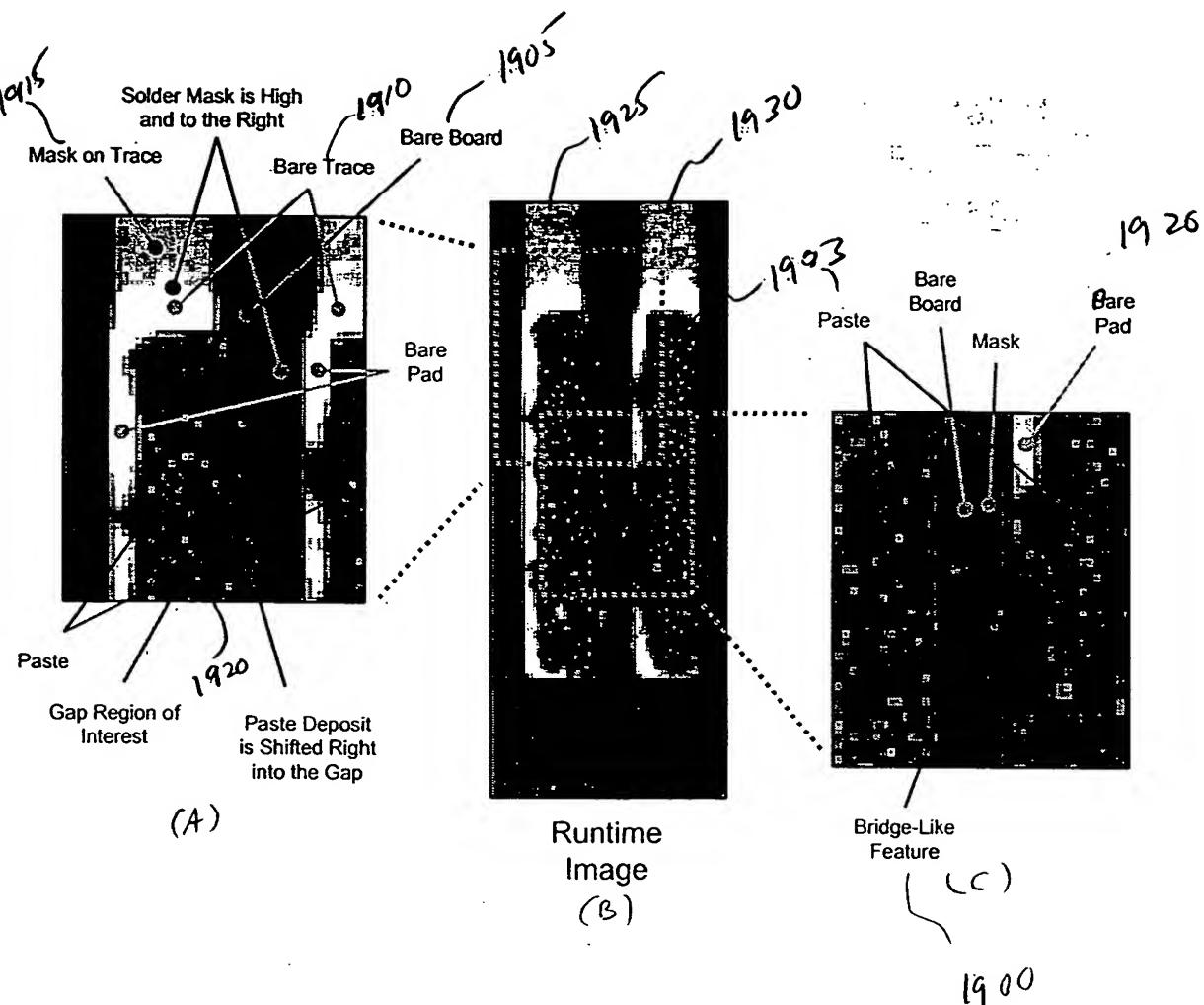


FIG. 19

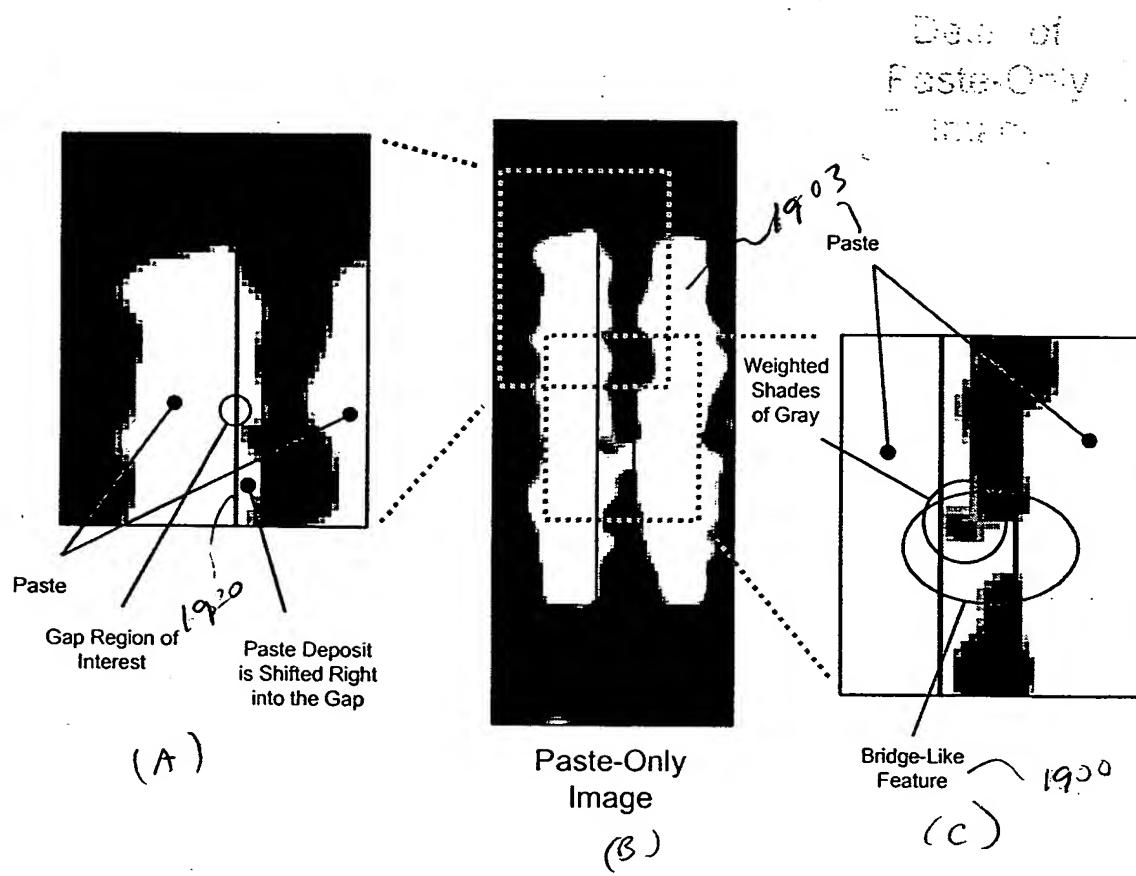


FIG. 20

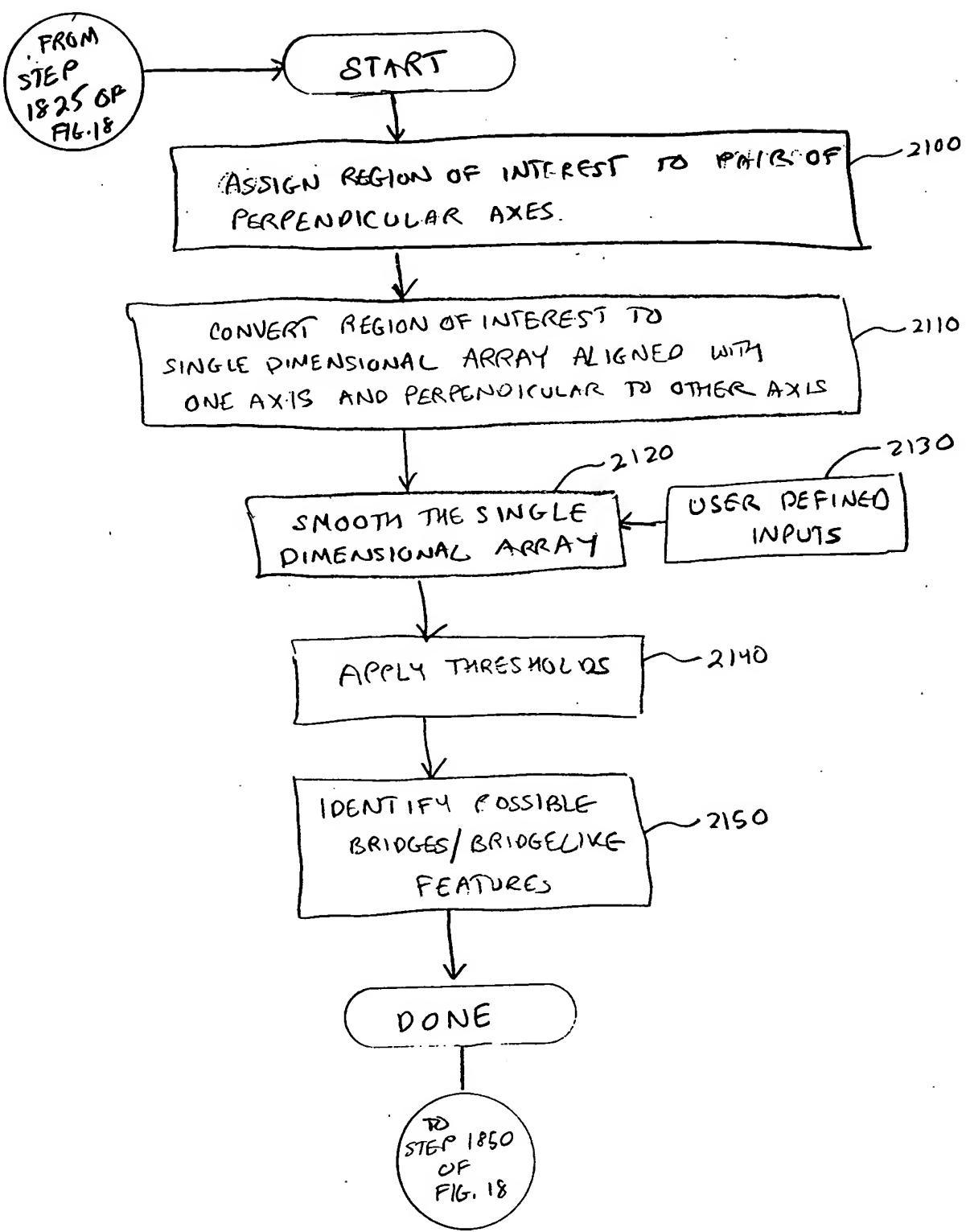


FIG. 21

Acquired &
Processed Images

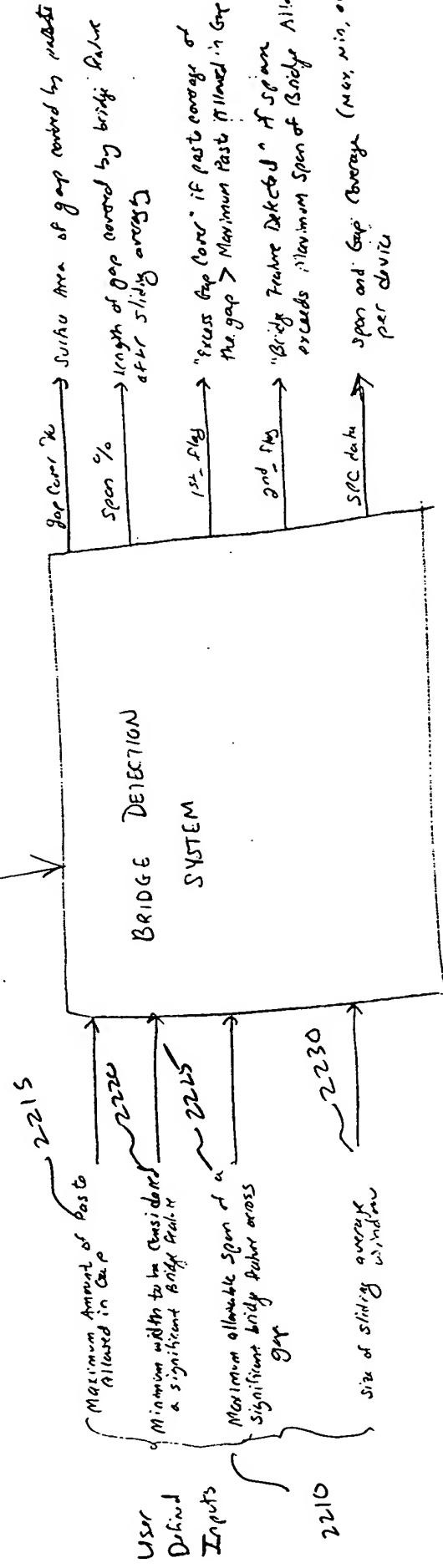


FIG. 22

2200

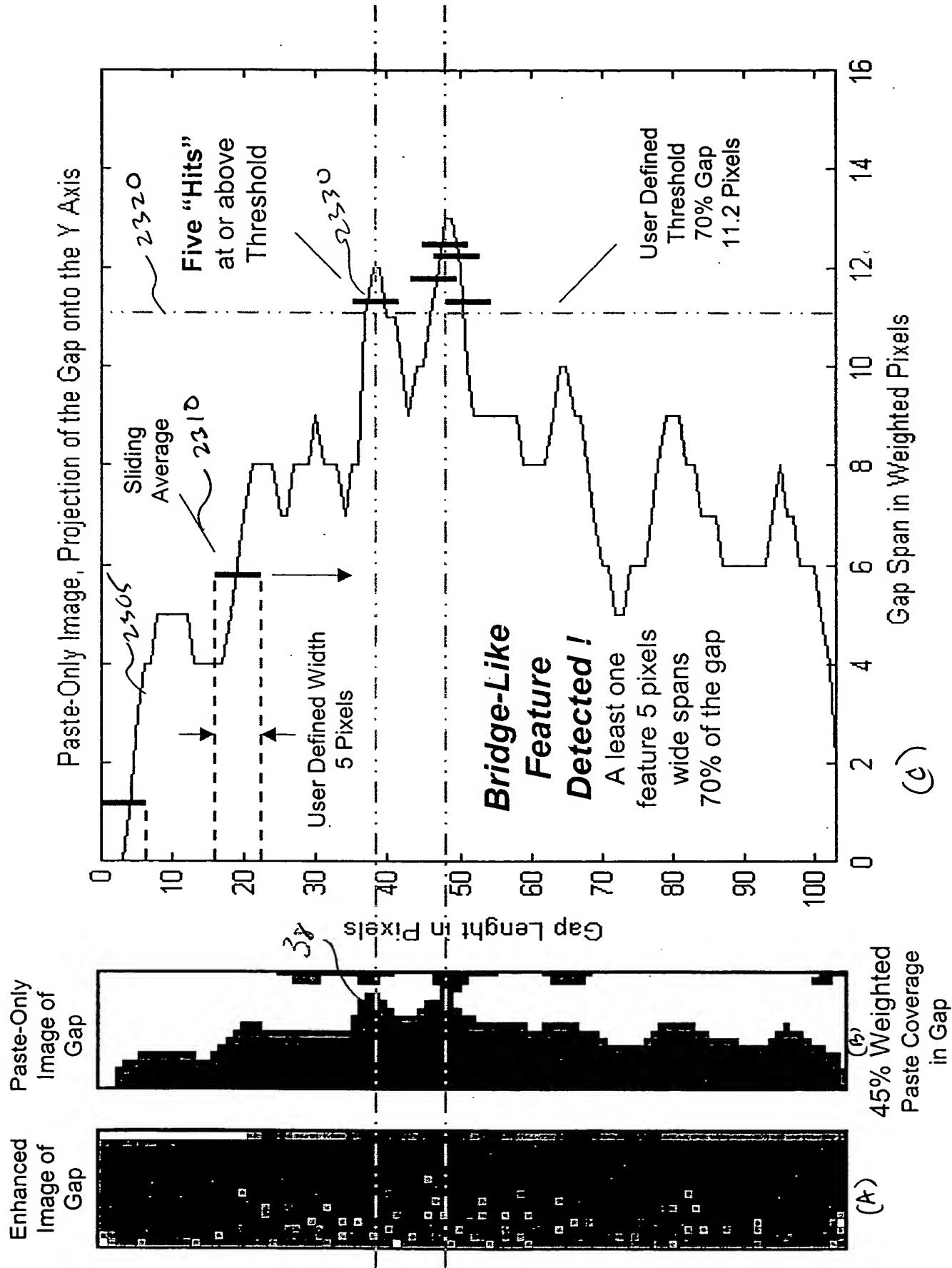
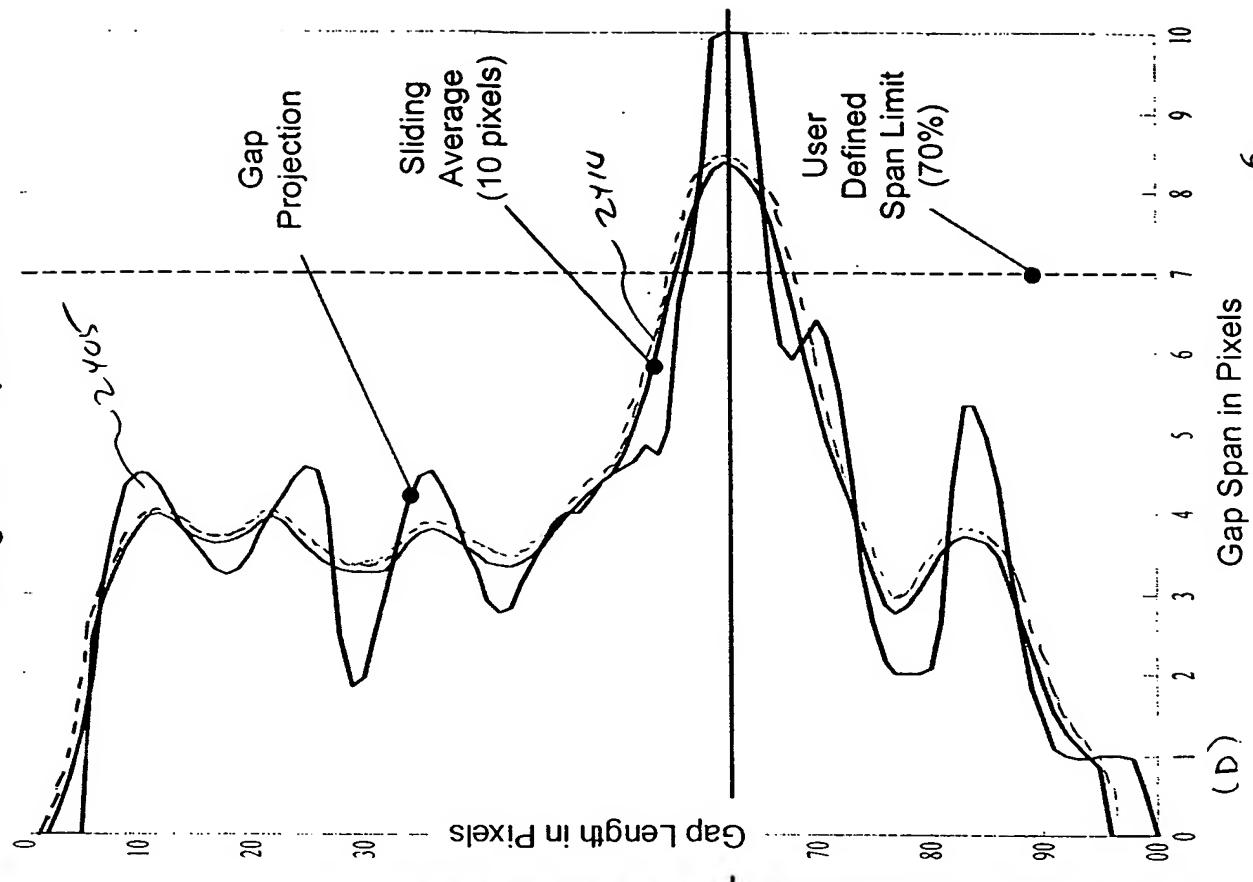


FIG. 23

Gap Projection and Sliding Average

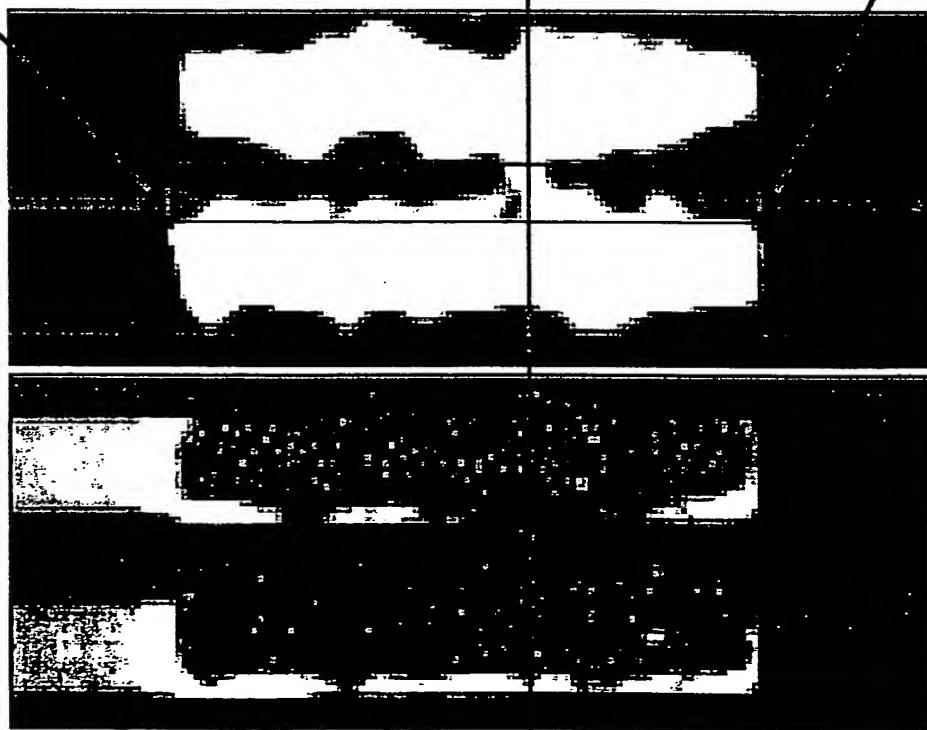
Weighted Projection



Run-Time Tile

Gap Projection

Paste-Only Tile



(A)

(B)

Gap ROI

Gap ROI

(D)

6

FIG. 2

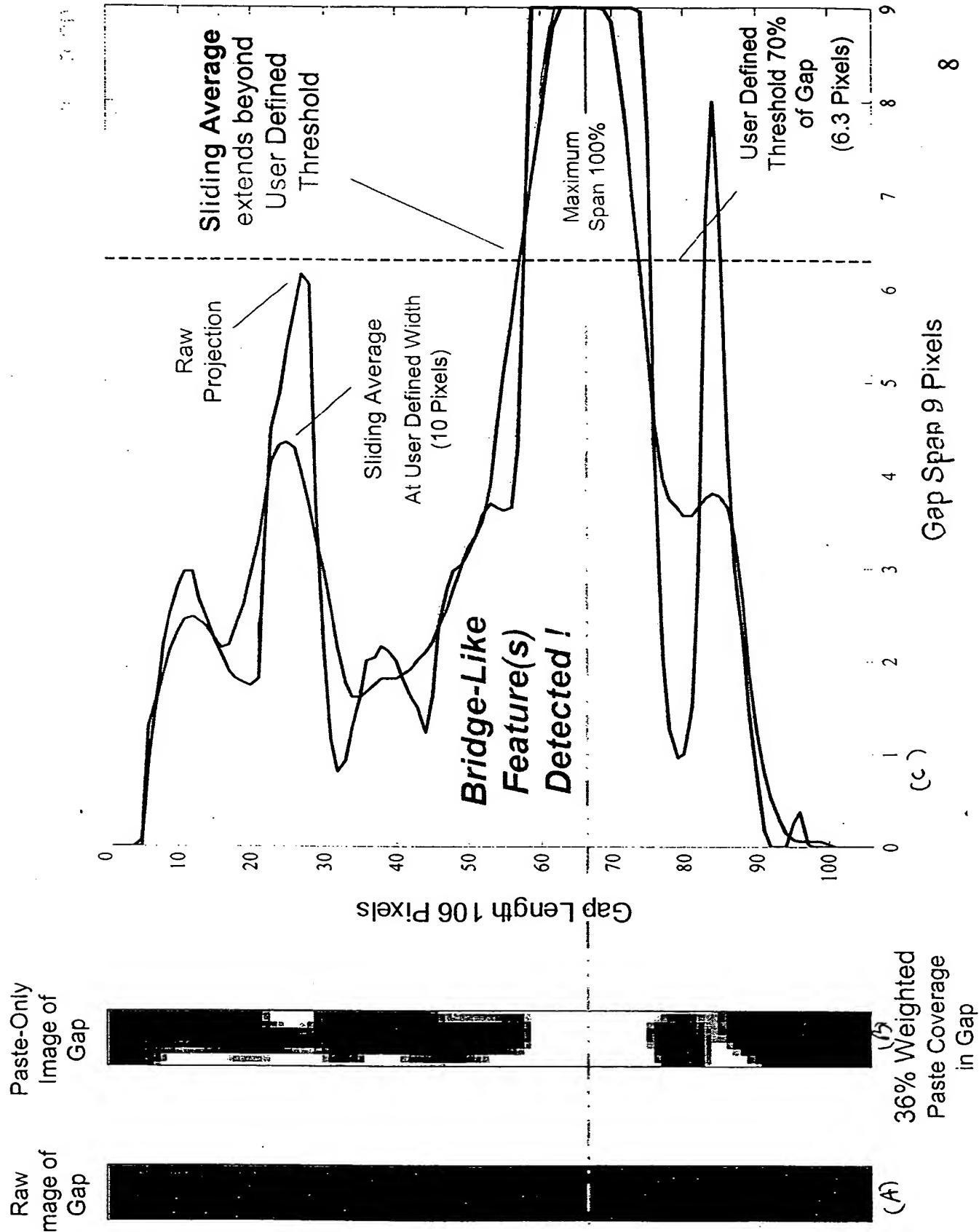
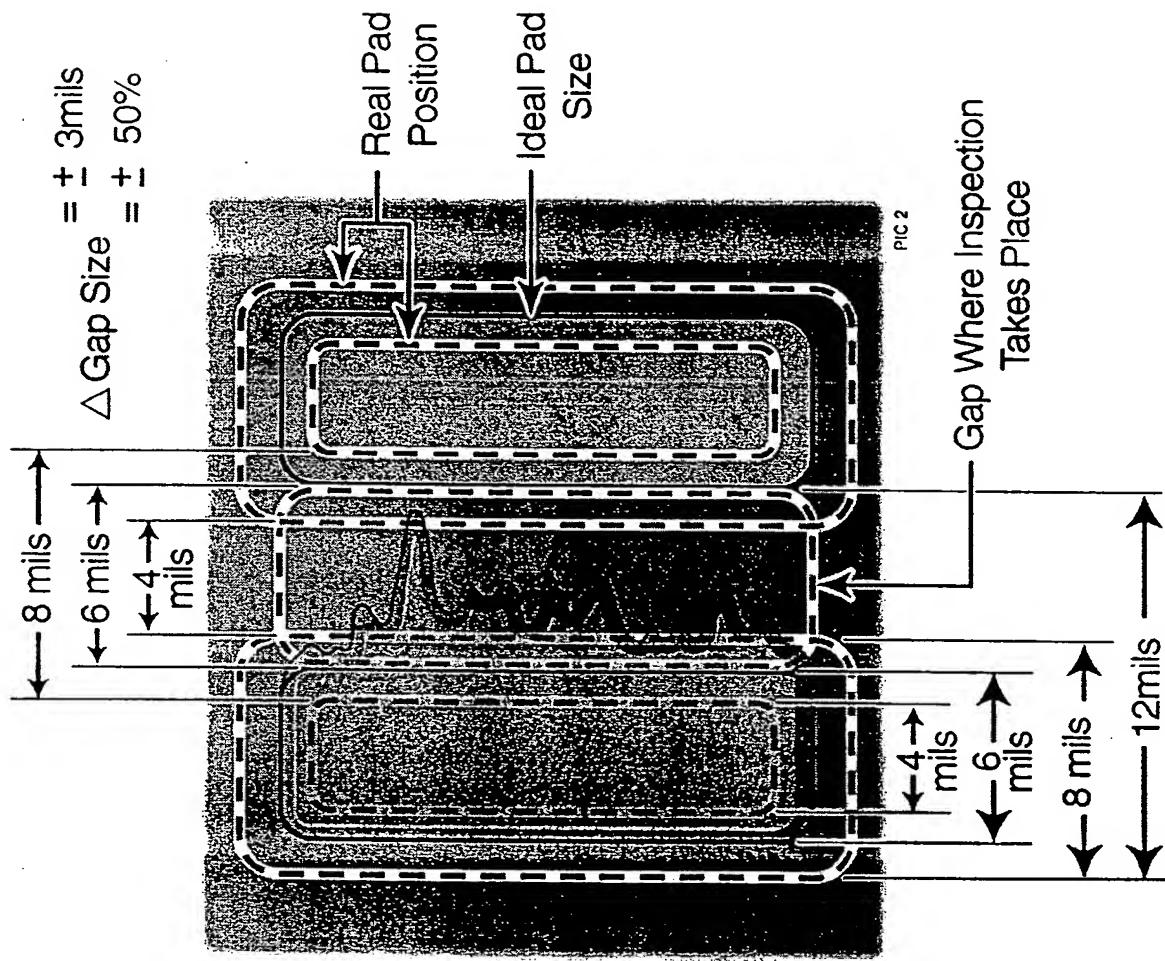
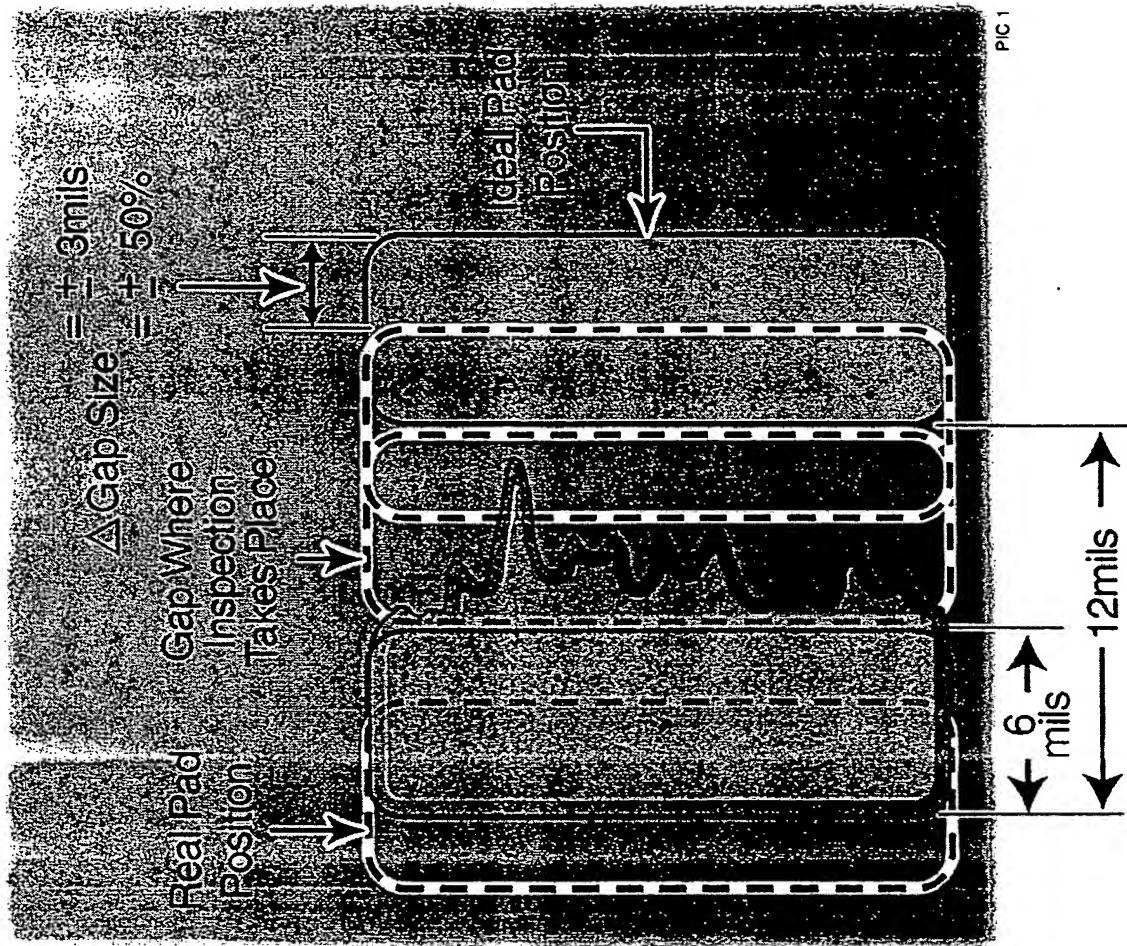


FIG. 25

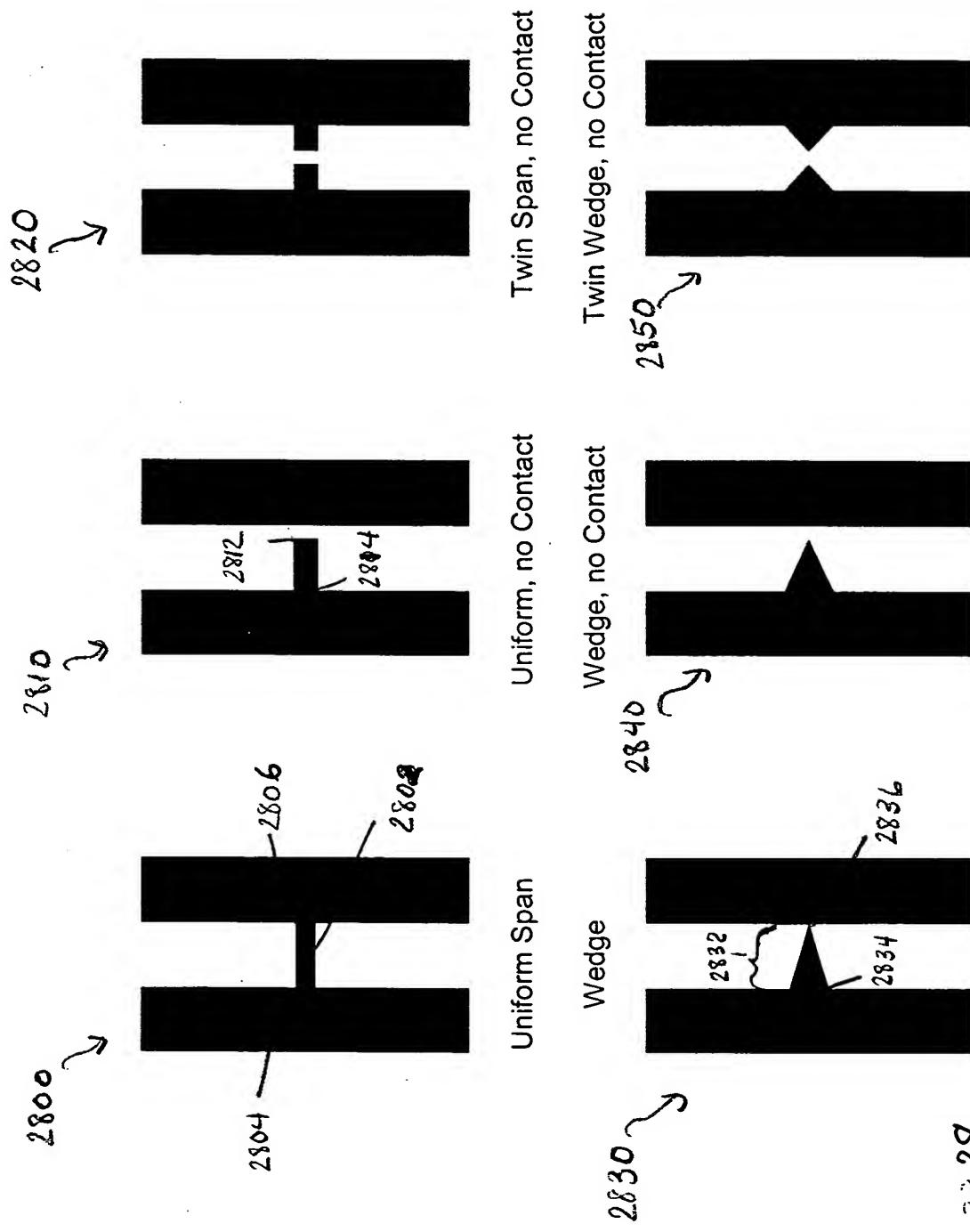
Effect of Pad Size Variations





20

F16.27



All "Bridges" Shown are 6% of Gap

FIG. 28

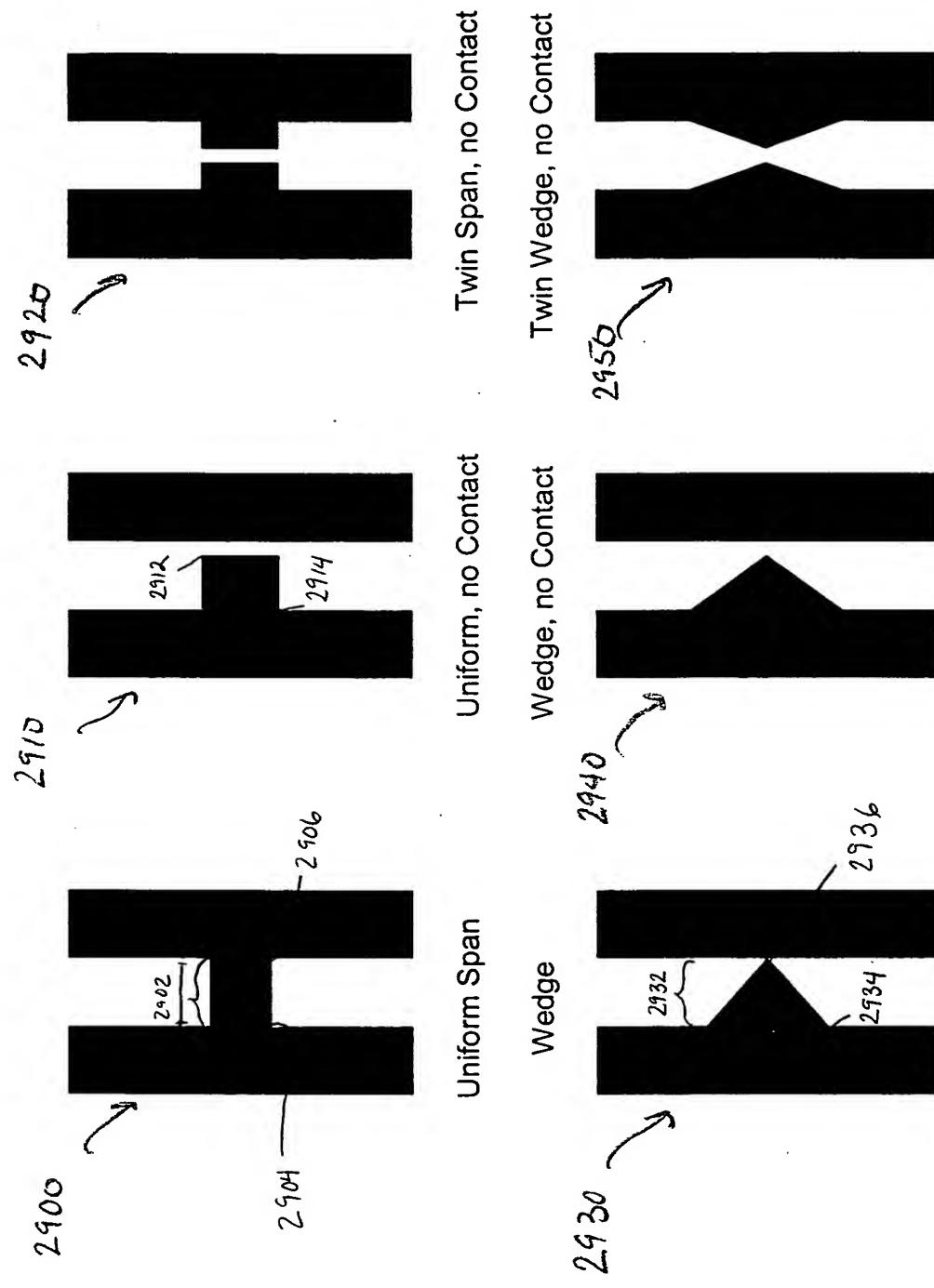
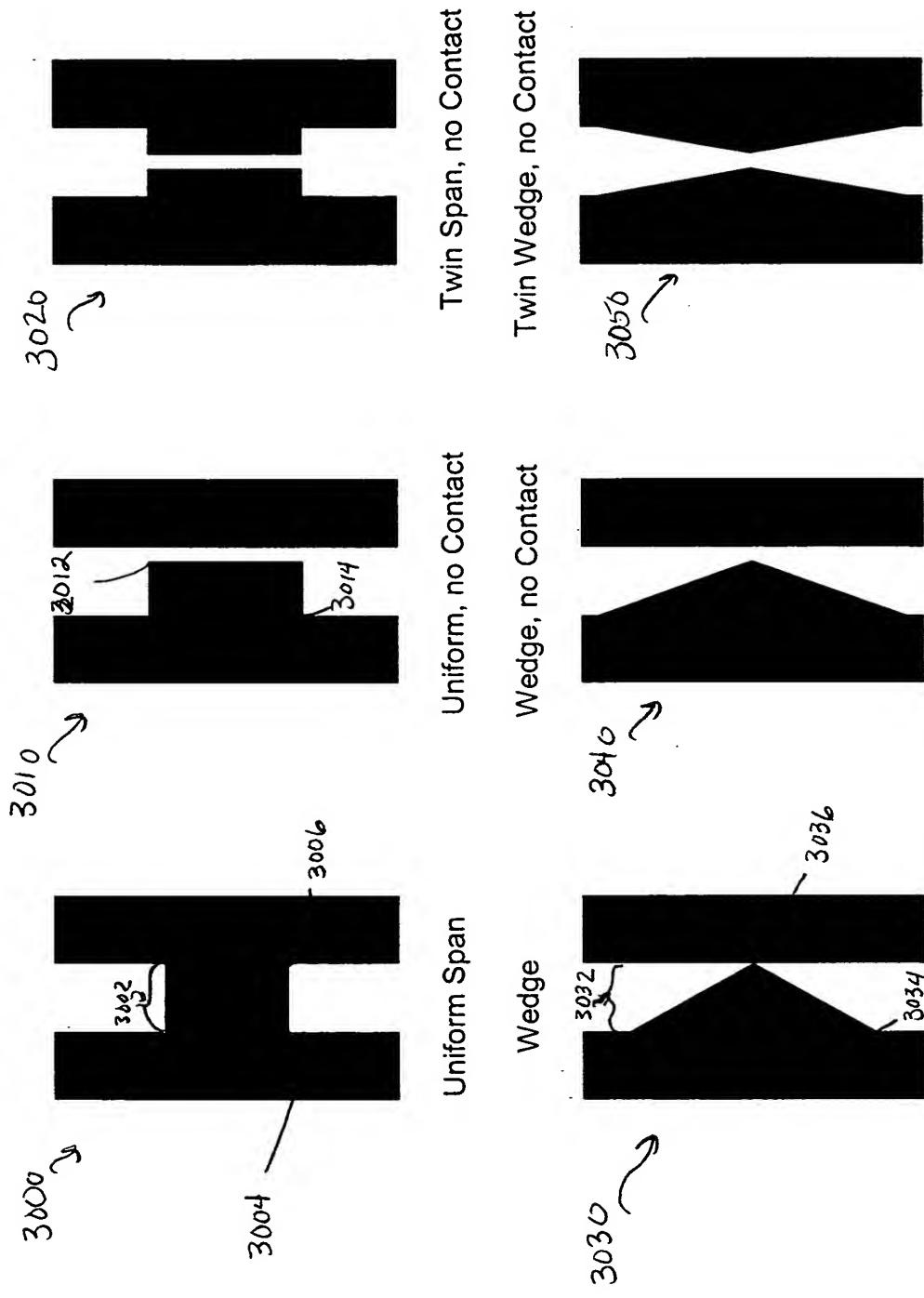


Fig. 2.9

“Bridges” are 18% of Gap

Fig. 30

“Bridges” are 36% of Gap



Other Gap Defects

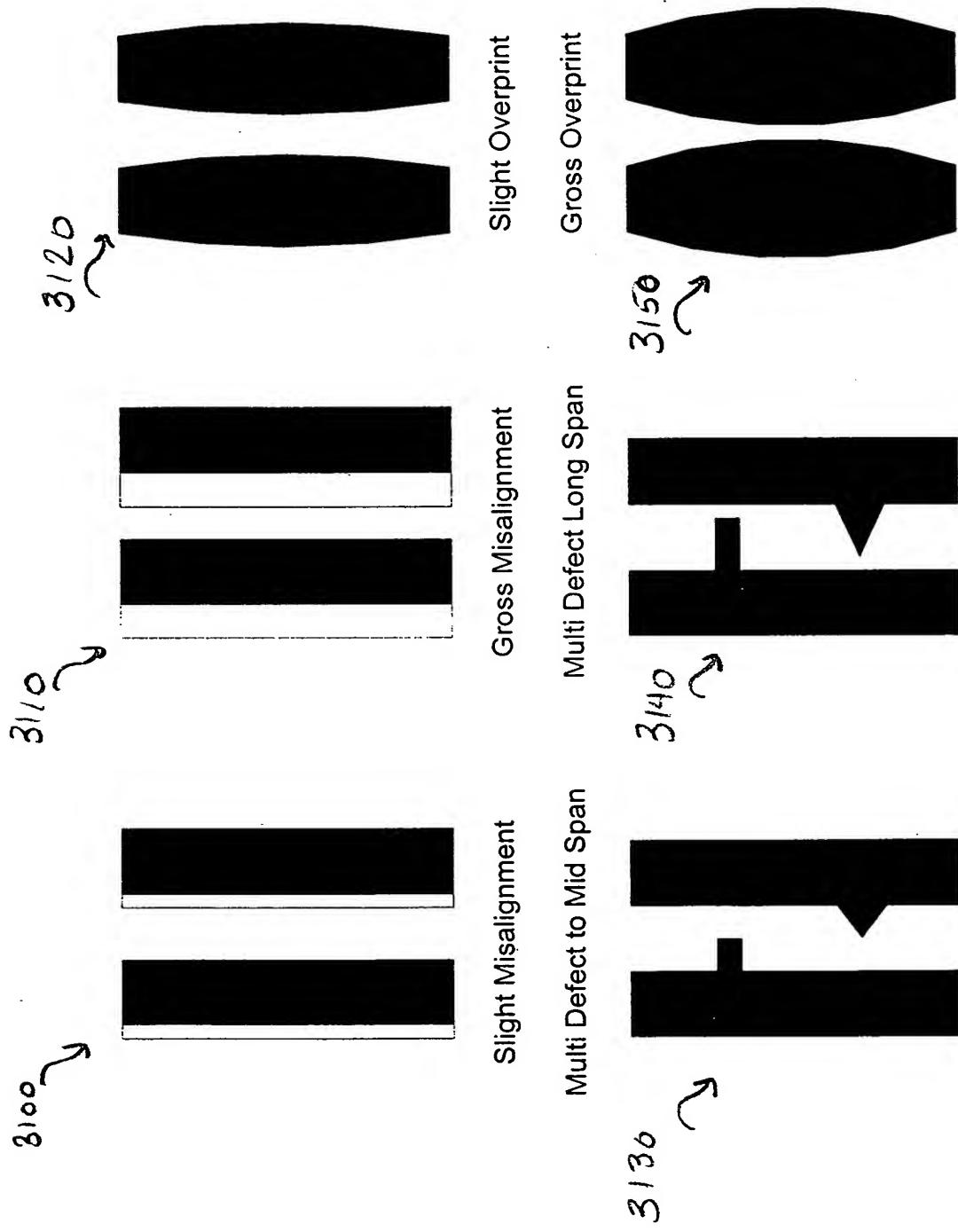


FIG. 31